CURTISS P-40

Snub-nosed Kittyhawks and Warhawks

CARL MOLESWORTH

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AIR VANGUARD 11

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INTRODUCTION

On November 22, 1944, a P-40N-40-CU Warhawk rolled out of the Curtiss-Wright Corporation factory in Buffalo, New York. Like so many P-40s built over the previous five years, it wore a camouflage scheme of olive drab over neutral gray and United States national insignias on the fuselage and wings. But there was more to see on this P-40 – a lot more.

On the rudder were the red, white, and blue stripes carried on prewar P-40s. The engine cowling featured a large shark's mouth and eye made famous by the American Volunteer Group in China, which also contributed a cartoon "flying tiger" to the mid-fuselage. Below the cockpit were 20 German crosses and 18 Japanese flags, signifying the aerial victory scores of the top P-40 aces of the Royal Air Force (RAF) and the US Army Air Force (USAAF). Also, the wings, tail, and fuselage were festooned with the roundels of 28 nations that had flown the company's iconic Hawk fighters since the introduction of the PW-8 more than two decades earlier.

Across the nose was the explanation for the garish paint job on the international Warhawk: "15,000th Curtiss Fighter" and a suitable set of hawk wings. The number recognized Curtiss-Wright as the most prolific American manufacturer of fighter planes to that date. In the coming days, Curtiss-Wright arranged several public relations events for the garish Warhawk. Then, presumably, the plane was stripped of its colorful plumage and placed into service, either in a stateside Army training squadron or in the Royal Australian Air Force (RAAF).

The irony attached to the international Warhawk is that despite the production achievement it represented, the plane was also one of the last production fighter planes Curtiss-Wright ever built. The company shut down its P-40 factories just a week later, and despite the best efforts of Curtiss-Wright executives and engineers, they never won another contract to build fighter aircraft. Four years later, on October 10, 1948, Curtiss-Wright closed its aircraft division and left the airplane manufacturing business entirely.

How did this happen? It's a classic tale of short-term gain producing long-term pain. The P-40 was never considered the best fighter in the skies, but it was good enough to remain in production while rival aircraft manufacturers invested in the research and development of new fighters that would carry them into the Jet Age.

Still, the Curtiss P-40 line of aircraft stood out among American fighter types for having remained in front-line operations from the summer of 1941,

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Curtiss-Wright test pilot H. Lloyd Child, center in flying gear, poses in November 1944 with company personnel in front of the P-40N-40-CU representing the 15,000th Curtiss fighter. (Glenn H. Curtiss Museum, Hammondsport, NY)

before the US entered World War II, through to the end of the conflict four years later. Only Grumman's versatile F4F Wildcat naval fighter could match that record.

This, the second volume on the P-40 in Osprey's Air Vanguard series, will cover the H-87 versions of the P-40, starting with the D-model. I have chosen to dub these aircraft "snub-nosed" P-40s because they had a shorter engine cowling than the previous H-81 models. "Snub-nosed" was not a historical term used to describe the planes at the time they were in service, but it effectively differentiates the late-model P-40s from their predecessors in a visual and – I hope – memorable way.

This book also will explore the five fighter prototypes Curtiss developed during the war as potential replacements for the P-40. Of these aircraft, only the XP-55 Ascender and XP-62 could be considered as "blank-sheet" designs. The rest were follow-on developments from the basic P-36/P-40 design and failed to produce significant enough improvements in performance over the P-40 to warrant replacing it on the production lines.

The P-40 has held a fascination for me ever since I first saw a picture of one with a fearsome shark's face painted on the nose when I was a small boy. My first opportunity to write about the P-40 came 35 years ago, when I was lucky enough to interview the late Col Gregory "Pappy" Boyington for a newspaper story. Since then I've written nearly a dozen books that focus primarily on the P-40, and I hope to finish several more before my time runs out. Thank you to the many hundreds of veterans who have contributed to my knowledge by sharing their stories about flying and maintaining the P-40 during World War II. I hope they all have felt their dealings with me amounted to time well spent. I know I do.

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Curtiss began manufacturing Hawk fighters in 1924 with the US Army designation PW-8. Here, Lt R. L. Maughan poses with the Hawk in which he made a dawn-to-dusk, coast-to-coast flight on June 19, 1924. (Glenn H. Curtiss Museum, Hammondsport, NY)

DESIGN AND DEVELOPMENT

A Long Line of Hawks

The outbreak of war in Europe on September 1, 1939, was surely one of the low points in the history of the 20th century. As German Panzers rolled into Poland and Stukas rained down bombs from the sky, the world got its first taste of Adolf Hitler's vaunted Blitzkrieg, or "Lightning War." There was no turning back, and soon all of Europe would be drawn into the fray.

Conflict in Asia, meanwhile, dated back to the early 1930s, when Japan set out on its steady and brutal path of aggression against China. In western eyes, this was merely a dispute between two relatively insignificant countries, though the suffering endured by the Chinese people was no less real nor less tragic than that of Europeans pummeled by Hitler's iron fist.

The United States watched from the sidelines as war spread across much of the globe. A strong political sentiment existed for non-intervention, though many leaders realized American armed forces inevitably would be drawn into the conflict. That didn't mean the United States was a disinterested bystander during the two years before Japan's attack on Pearl Harbor forced the nation into World War II, however.

For American manufacturing companies, the new war in Europe presented opportunities to grow at unprecedented rates. A decade of the Great Depression had savaged the markets for most of their products, but now lucrative contracts to build weapons for the warring nations would soon have American factories humming again. In particular, the aircraft industry in the United States was eager to gear up after struggling through long years of meager orders for military and civilian airplanes.

One of the American aircraft manufacturers best positioned to take advantage of the new demand for military airplanes was the Curtiss-Wright Corporation of Buffalo, New York. The product of a merger of the companies of aviation pioneers Glenn Curtiss and the Wright brothers, Curtiss-Wright in 1939 was the largest airplane manufacturer in the country. Its products included not only a wide array of civilian and military airplanes but also the Wright engines to power them.

Of all the aircraft lines manufactured by Curtiss, none was more famous than the Curtiss Hawk fighters. From the initial PW-8 of 1924 through the Hawk III, which ceased production in 1938, Curtiss built more than 700 Hawk biplanes in 16 different models for the US Army alone. The steady stream of orders for Hawks from the US Army and US Navy, plus export customers, was a big factor in Curtiss's ability to stay afloat during the lean years of the Great Depression while also keeping pace with the technical advances of this period.

A more modern monoplane Hawk came along in 1935. In response to an Army Air Corps design competition in the fall of 1934 for a new aircraft that would usher in the modern era of single-seat military fighters, Curtiss

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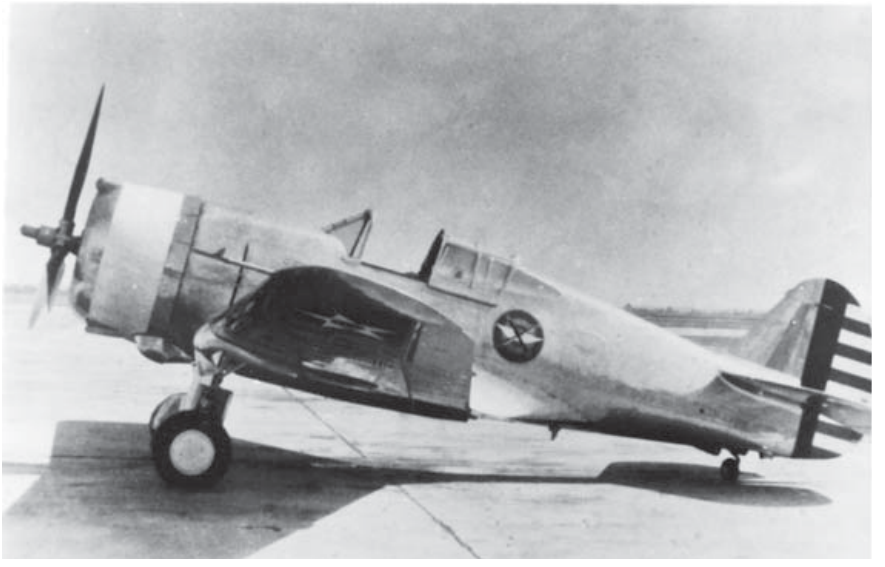

Pilots loved the Hawk 75/P-36, the standard US Army fighter of the late 1930s, for its maneuverability and lack of vices. Chief engineer Donovan Berlin designed "stretch" into the airframe. This P-36A was assigned to the 55th Pursuit Squadron/20th Pursuit Group. (Tom Ivie)

produced the Hawk 75, which the Army designated the P-36. Chief designer Donovan R. Berlin built "stretch" into the Hawk 75's airframe that would allow it to accommodate high-horsepower engines that were not yet developed. Specifically, he wanted to provide adequate wingspan and area to ensure excellent flight characteristics at 25,000ft and above.

The Hawk 75's structure was all-metal, with metal skin on all but the moveable control surfaces, which were covered with fabric. The fuselage was semi-monocoque construction, built in halves and joined after internal components had been installed. A sliding canopy with minimal metal bracing provided a smooth airflow while also giving the pilot reasonably good visibility out of the cockpit. A metal skid under the belly minimized damage in the case of a wheels-up landing. The plane was also designed for ease of maintenance: everything forward of the firewall could be changed in 14 work hours.

The wing featured hydraulically-operated split flaps in the trailing edge, inboard from the ailerons. The wings also held the retractable undercarriage. This unusual design featured a single strut under each wing that rotated aft roughly 90 degrees while also pivoting around its axis to turn the wheel 90 degrees so it could lie flat in the thinner aft portion of the wing. Berlin recalled that the new plane flew unusually well right out of the box.

A change of engine to the new 1,050hp Pratt & Whitney R-1830-13 Twin Wasp produced the Y1P-36. Testing revealed a top speed of 300mph, initial climb of 2,100ft per minute, a service ceiling of 33,200ft, and a range of 885 miles. On June 6, 1937, the Army Air Corps ordered 210 P-36s from Curtiss, the largest US fighter purchase since World War I.

Rising international tensions boosted demand for Hawk 75s. Realizing its domestic aircraft manufacturers were several years away from introducing modern fighters in large numbers, the French government made arrangements to buy 100 Hawk 75s, and that number eventually grew to more than 250. Other buyers followed, including Argentina, China, Great Britain, India, Iran, Norway, Netherlands East Indies, Peru, and Thailand. Manufacture of the Hawk 75 continued into 1941, and these sturdy fighters fought on nearly every front during the war.

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Curtiss created the Hawk 81/P-40 by replacing the air-cooled radial engine of the Hawk 75 with an Allison V-1710-33 liquid-cooled inline engine of similar horsepower output. The V-12 Allison allowed the Curtiss designers to give the plane a streamlined nose. This P-40-CU was assigned to the 79th Pursuit Squadron/20th Pursuit Group. (Molesworth collection)

The Hawk 81

Though the P-36 exhibited excellent flying characteristics, its top speed barely exceeded 300 miles per hour. The Army considered this speed acceptable in 1937, but by the following year, the P-36 lagged behind the latest European fighters – particularly the British Supermarine Spitfire I and German Messerschmitt Bf 109E – by at least 50mph. Curtiss made several attempts at wringing more speed out of the Hawk 75 airframe, but the one that worked best also was the simplest to effect.

Curtiss designer Donovan Berlin had first envisioned the Hawk 81 in early 1938, when the US Army Air Corps announced a new pursuit competition, with a call for bids on January 25, 1939. The specifications called for a fighter with top speeds of 310 to 370mph to be reached at 15,000ft, with a two-hour endurance at cruising speed.

Since Curtiss already had the excellent Hawk 75 airframe with "stretch" to handle different powerplants, Berlin decided to mate the 75 to the new Allison V-1710, a liquid-cooled V-12, to produce the Hawk 81. He knew that the Army favored using the inline Allison for fighters because it offered advantages in streamlining over radial engines, but he was unsure whether the Allison could create enough power to produce a 370mph Hawk. After checking with Allison and learning the V-1710 could produce 1,050hp at 15,000ft by stepping up the speed of its integral gear-driven supercharger, Berlin pitched his new fighter project to the Army in a proposal to the Material Division dated March 3, 1938. Berlin's strategy would allow Curtiss to place its new fighter into production up to a year sooner than competing manufacturers' clean-sheet designs.

Initial tests of the Hawk 81, designated by the Army as the XP-40, were disappointing. Despite its sleek profile, the new fighter barely topped the speed of the P-36. Thus began a quest for more speed that would last throughout the service career of the P-40. Berlin massaged the XP-40's contours in a wind tunnel and eventually boosted its top speed to 366mph at 15,000ft. Two other proposed fighters, the Lockheed XP-38 and Bell XP-39, featured turbocharged Allison engines that produced higher top speeds, but these were not considered sufficiently developed to warrant production contracts at that time. Though the XP-40 had yet to satisfy the desired performance specifications set out by the Army, the low price and quick availability of the new Curtiss fighter carried the day. The Army issued a record-setting contract to Curtiss on April 26, 1939, for 524 P-40s at a cost of nearly $13 million.

The production model, designated P-40-CU, featured the V-1710-33 Allison engine and carried four machine guns – two .50-caliber weapons in the upper cowling and one .30-caliber gun in each wing. The plane had a reasonable turn of speed and retained most of the maneuverability of the P-36; but the P-40 was a slow climber, and its performance peaked at the relatively low altitude of 15,000ft. In service, the P-40 airframe would prove sturdy and its engine reliable.

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Again, foreign customers came calling at Curtiss. France again was first to order the export version of the P-40, tagged the Tomahawk by Curtiss. None of the 185 Tomahawks France ordered in May 1939 had been delivered before that nation fell to Germany a year later, but Great Britain was desperate by then to obtain additional fighters for the Royal Air Force and took over the French order, along with placing its own order for Tomahawks.

The first significant upgrade to the line was the P-40B-CU, or H-81A-2. The changes in this model were the product of intelligence gleaned from the air battles that took place during the first year of war in Europe. They included refinements such as self-sealing fuel tanks, armor protection for the pilot behind the seat and in the windshield, and the addition of a second .30-caliber machine gun in each wing. This aircraft, with .303-caliber machine guns in the wings, became the Tomahawk IIA in RAF service. Improved self-sealing tanks were introduced in the P-40C-CU (Tomahawk IIB in the RAF, again with .303-caliber wing guns). These reduced the internal fuel capacity from 160 gallons to 135, so the provision to carry an external 52-gallon drop tank on the centerline was added on the P-40C to compensate.

Curtiss built 525 Hawk 81s in three versions of the P-40 for the US Army. Only a few of these saw combat in Hawaii, the Philippines, and Iceland early in the war. More than twice as many export Hawk 81 Tomahawks were built. These 1,181 aircraft fought extensively with the Commonwealth air forces in North Africa, the American Volunteer Group of the Chinese Air Force in Burma and China, and with the Soviet Air Force on the Eastern Front.

The Hawk 87 – A Tale of Two Engines

During France's final weeks of freedom prior to surrendering to Germany on June 22, 1940, the French Air Force issued an order to Curtiss for additional fighters to supplement the 142 Hawk 81-A1s ordered in March. The Royal Air Force was also in line to buy more Hawks, and production of P-40-CUs for the US Army was gearing up as well. Soon Curtiss would open a second production facility in Buffalo to handle the demand.

There was no denying that the latest Hawk was a commercial success for Curtiss, but a challenge was looming for Donovan Berlin's design staff. Thus far, Curtiss had been unable to wring sufficient performance from the Hawk 81 to match the best European designs, and one of the main problems was that the plane was underpowered. The output of the 1,090hp Allison V-1710-33 engine, with its single-stage supercharger, was insufficient to propel the airframe to its maximum capabilities for speed and service ceiling. This problem was even more pressing for the twin-engine turbocharged Lockheed XP-38 then in development. The US would soon need fighters with more power than the current C-series V-1710 could deliver, so Allison designers went to work on the problem.

Unfortunately, the solution wasn't so simple as merely souping up the engine. The C-series V-1710 delivered power to the propeller via an internal spur reduction gearbox, but this device was only able to handle 1,100hp and the engine was already pushing this limit. The new Allison – and all F-series Allisons to follow – featured an external propeller reduction gearbox drive, which was beefed up sufficiently to handle the 1,150hp of the V-1710-39 (F3R) and more. The reduction ratio remained 2:1, but the new engine was 10.16in. shorter than previous versions, and the thrust line was raised several inches so the gearbox could mount between the cylinder banks at the front of the engine.

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The Hawk 87 retained the flying surfaces of the Hawk 75 and 81 but had a new fuselage to accommodate the raised thrust line of the more powerful Allison V-1710 F-series engine. This P-40E-1, serial number 41-24902, was photographed in Egypt in late 1942. (Molesworth collection)

The redesign of the V-1710 had major implications for Curtiss, because the new engine – with its shorter overall length and raised thrust line – did not conform to the nose contours of the Hawk 81. It not being practical to craft a new nose for the Hawk 81, Curtiss designers took this opportunity to draw up an entirely new fuselage. The change was considered sufficient to cause Curtiss to give the plane a new designation: the Hawk 87. The US Army continued to call it a P-40, designating it the D-model, while the Royal Air Force gave it a new name: the Kittyhawk.

The Hawk 87 incorporated a number of improvements over the Hawk 81. The snub-nosed fuselage was not only 6in. shorter but also slightly shallower, top to bottom. Up front, the nose guns were eliminated, and a deeper cowling with a larger opening held the coolant and oil radiators under the engine. Because the propeller hub sat higher on the nose, the landing gear legs could be shorter and still allow clearance for the propeller during takeoffs and landings.

To improve visibility for the pilot, the cockpit opening was deeper, with a larger sliding canopy and an enlarged windshield with flat, bulletproof glass in the center panel. The rear-view coves behind the cockpit also were bigger. In addition, the airframe was stressed to carry one 500lb bomb or a drop tank of 52 or 75 gallons under the belly. The wing and tail designs were relatively unchanged from the Hawk 81. The new plane's guns were mounted in large bays in the wings and aimed so their fire would pass outside the arc of the propeller, converging about 300 yards in front of the plane. The P-40D/Kittyhawk I carried four .50-caliber Browning machine guns; most subsequent versions carried six, with 280 ammunition rounds per gun. The new P-40 also could carry two 100lb bombs or a load of smaller bombs under its wings.

The Hawk 87 line was a superior warplane to the Hawk 81, but not by much. While the changes in armament made it more versatile, the new model's performance remained unimpressive. As a result of all the changes, the Hawk P-40D's combat gross weight rose to 8,809lb. At the same time, the new V-1710-39 engine produced just 60hp more than its predecessor. Despite having

A

P-40 ENGINES

The two engines that powered the production versions of the H-87 P-40 were (**above**) the Allison V-1710 in the P-40D, E, K, M, and N (Kittyhawk I, III, and IV) and (**below**) the Packard Merlin V-1650 in the P-40F and L (Kittyhawk II). The quest for more speed and a higher service ceiling than the reliable Allison delivered in the P-40D/E led to the introduction of the Merlin 28, which was an Americanized version of the highly successful Rolls-Royce engine that powered the Spitfire, Hurricane, and other British aircraft. Unlike the British engine, which featured a two-stage supercharger for high-altitude performance, this engine used a single-stage, two-speed supercharger. As a result, the Merlin-powered P-40s enjoyed only a modest gain in service ceiling and otherwise were virtually identical in performance to their Allison-powered brothers. The Merlin-powered P-40s were distinguishable by their deeper chin radiator cowlings and the lack of an air intake scoop atop the engine.

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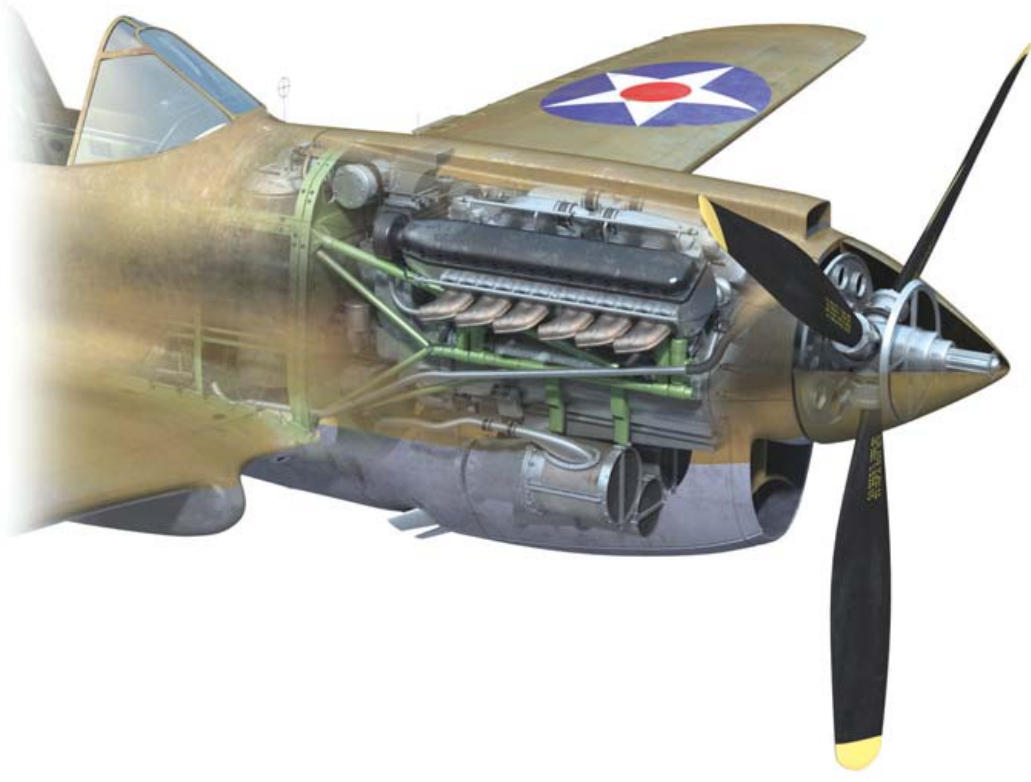

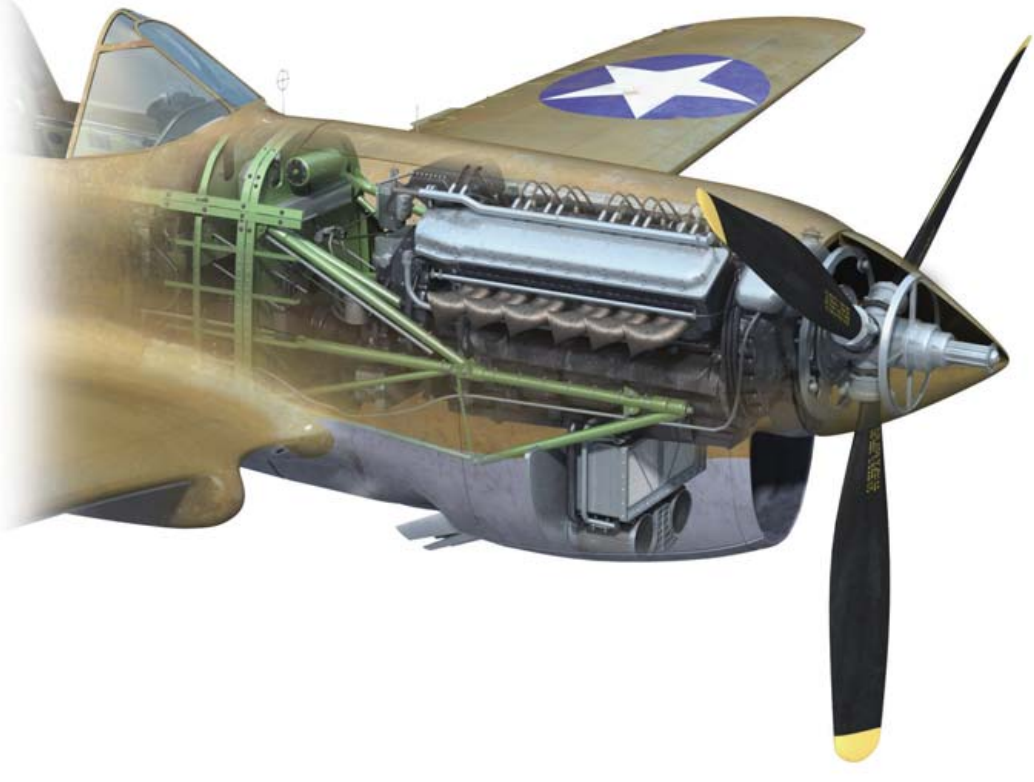

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All Hawk 87s were built in the two Curtiss factories in Buffalo, New York. This shot, taken in September 1942, shows Allison-powered P-40Ks on the right coming together alongside P-40Fs with Packard Merlin engines. In all, Curtiss manufactured 13,736 P-40s from 1939 through 1944. (Glenn H. Curtiss Museum, Hammondsport, NY)

a slightly sleeker profile than the P-40C, the P-40D boasted a top speed just 5mph faster than the previous model, at 350mph. Because the new engine retained a single-stage supercharger, the P-40D's service ceiling and peak performance altitude of 15,000ft were virtually unchanged from the P-40C.

The US Army placed an order with Curtiss for 23 P-40Ds in 1940 and took delivery of the new planes in mid-July 1941. Great Britain, meanwhile, took over the French order with modifications to RAF specifications. Designated Kittyhawk Is, these aircraft began rolling off the assembly lines in August 1941. The first 20 were four-gun equivalents of the P-40D, but the rest of the Kittyhawk Is in the 560-plane order mounted six guns, like the US Army's 820 P-40Es that were built alongside them. Deliveries of both continued through the end of the year, by which time the United States had entered the war. Great Britain obtained its Kittyhawk Is by direct purchase from Curtiss. Two were lost in shipment, ten went to the UK, 72 to Canada, and 476 to the Middle East for Commonwealth squadrons. All subsequent Kittyhawks would be drawn from US Army stocks and provided to Great Britain and other Allied nations through America's Lend Lease program.

A very similar version, the P-40E-1/Kittyhawk IA, had a beefed up wing structure to allow it to carry more external stores. Curtiss built 1,500 of these, and about one-third of them went to the Allies under Lend Lease.

Just as the first P-40Es and Kittyhawks began rolling out of the Curtiss plants, a new development emerged that seemed to hold great promise for future Hawk 87s. Frustrated by the lack of significant progress at boosting the output of the Allison V-1710 engine, the US Defense Advisory Commission had chosen the Packard Motor Company in September 1940 to manufacture a version of the outstanding Rolls-Royce V-1650 Merlin under license. The engine at that moment was establishing its place in history as the powerplant of the Spitfire and Hurricane fighters, which were winning the Battle of Britain. Packard, noted for the quality of its engineering staff and its machining abilities, converted the Merlin from metric to US specifications, and its V-1650-1 ran for the first time in August 1941.

Packard engine designer Nils J. Skrubb incorporated several key modifications in his version of the Merlin. The main crankshaft bearings were changed from a copper lead alloy to a silver lead combination, and featured indium plating to prevent corrosion. The bearing coating also improved the break-in and load-carrying ability of the surface. Like the Allison, the V-1650-1 used a single-stage, two-speed supercharger. The new engine soon proved itself superior not only to the V-1710 but also to Rolls-Royce-built Merlins. Externally very similar in size and shape to the Allison, the Packard Merlin was a natural fit for the P-40.

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Curtiss converted a P-40D (40-360) to the XP-40F, the first Merlin-powered Hawk. The design team experimented with several locations for the radiator before settling on a layout under the engine, similar to that of the Allison versions for the production P-40F. Because the Merlin was fitted with an updraft induction system, the air intake scoop was removed from the top of the cowling; the radiator cowling opening was enlarged to provide room for a duct to feed air to the engine. The US Army quickly placed an order for 699 P-40Fs. According to some sources, these were the first P-40s to be called "Warhawks."

The raised thrust line and larger radiator scoop of the snub-nosed Hawks are evident in this picture of a 57th Pursuit Group P-40E in Connecticut during early 1942. The fairings for the muzzles of its six .50-caliber machine guns have been removed from the wings. (W. T. Robison via Steven Robison)

The V-1650-1 engine in the P-40F was rated at 1,240hp, producing a best-yet top speed of 364mph. More important, the P-40F was able to reach top speed at 20,000ft, which was 5,000ft higher than the peak altitude of Allison-powered P-40s. Otherwise, the flight characteristics and armament of the P-40F and the P-40E/E-1 were much the same. Curtiss built 1,311 P-40Fs in five versions from January 1942 through January 1943.

Later, Packard would develop an outstanding two-stage supercharger that would allow the Merlin to produce power at much higher altitudes, but these engines never found their way into the P-40. Rather, the US Army decided in the spring of 1943 to allocate all further Merlin production to the North American P-51 Mustang, which was considered a more promising design. That decision left 123 unfinished P-40Fs and Ls without engines, so these were fitted with Allison V-1710-81s and designated the P-40R.

One flight characteristic that carried over from the earliest long-nosed P-40s was poor directional stability. The plane had a marked tendency to swing its nose during takeoff and landing, and it wanted to roll in a dive. Australian ace Clive R. "Killer" Caldwell described his technique for diving Tomahawks and Kittyhawks:

> They picked up speed quickly in a dive, but at steep angles of dive at high speed, considerable strength of arm and leg and/or a lot of activity with the trim gear was needed to keep control.

The Curtiss design staff tried several fixes to improve stability by modifying the tail of the Hawk 87, but chief designer Donovan Berlin became convinced that the problem was caused by hot air spilling out of the front of the big radiator opening in the nose. Curtiss management rejected his arguments for revising the nose, and as a result a disgusted Berlin left the company in late 1941.

A deeper chin scoop and lack of an air intake on top of the cowling distinguish the nose of Merlin-powered P-40Fs and P-40Ls. This bombed-up P-40L-5, No. 01 (serial number 42-10653), was flown by Col W. K. "Sandy" McNown, commanding officer of the 324th Fighter Group, USAAF, in Italy during 1943. (Craig Busby)

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A Chinese crewman runs-up the Allison V-1710-81 engine of a P-40N in China during 1945. The grouping of two coolant radiators with an oil cooler between them was standard on Allison-powered P-40s. (Harry Lee)

The first new tail design debuted near the end of the P-40E-1 production run and continued on the P-40K-1 and K-5, which were powered by the 1,325hp Allison V-1710-73. This curving dorsal fillet attached to the front of the vertical stabilizer. If this tweak had any effect on the P-40's directional stability during takeoffs, it was easily offset by the increased power of the P-40Ks. Pilots did remark on a slight improvement in directional and lateral stability while diving, however.

Curtiss was still working on the stability problem when manufacture of the P-40F began in January 1942. One airframe was fitted with a large, triangular dorsal strake, but that scheme apparently didn't work any better than the P-40K tail. Next, Curtiss tried extending the fuselage on P-40F-1 41-14137, and this was the solution that held. Leaving the horizontal stabilizer in its original location, the designers added 20in. to the rear of the fuselage and moved the fin back so the entire rudder extended beyond the end of the fuselage.

Extending the fuselage did improve the P-40's stability somewhat, and Curtiss instituted the change on the P-40F-5, producing 123 of them in August 1942. All subsequent Merlin-powered P-40s featured the long tail as well. The first Allison-powered P-40 with the long tail was the P-40K-10, a winterized version built during October and November 1942. The P-40K-15 followed right behind, again winterized with the extended tail, and all P-40Ms and Ns had the long fuselage as well.

The P-40M, built in three versions between November 1942 and February 1943, was a follow-on to the long-fuselage P-40K, but with a V-1710-81 engine. A cooling grille was added forward of the exhausts stubs, this being the best visual clue for distinguishing between a P-40K and a P-40M. The P-40M was the heaviest of the Allison-powered P-40s, with an empty weight of 6,464lb.

B

1: XP-40F

Curtiss grafted the new license-built Packard Merlin engine onto an early production P-40D to create the XP-40F. The new engine's updraft carburetor dictated moving its air intake underneath the engine, so the radiator inlet was enlarged to make room for it.

2: XP-40Q

Looking remarkably similar to the North American P-51D Mustang, the XP-40Q was a case of too little too late. Though a vast improvement over previous P-40s, the Q still couldn't match the speed and altitude performance of the Mustang, which was already in mass production by the time this aircraft rolled out.

3: XP-46

Curtiss attempted to wring more speed out of the Allison V-1710 by designing the XP-46 as a smaller aircraft than the P-40 and cleaning up the airframe with inward-folding landing gear. Performance gains were minimal, and no orders were forthcoming.

4: XP-60

The XP-60 was developed from the unsuccessful XP-53 and shared its laminar-flow wing. The first prototype was Merlin-powered, but the C-model was fitted with a tried-and-true Pratt & Whitney R-2800 driving contra-rotating three-bladed propellers.

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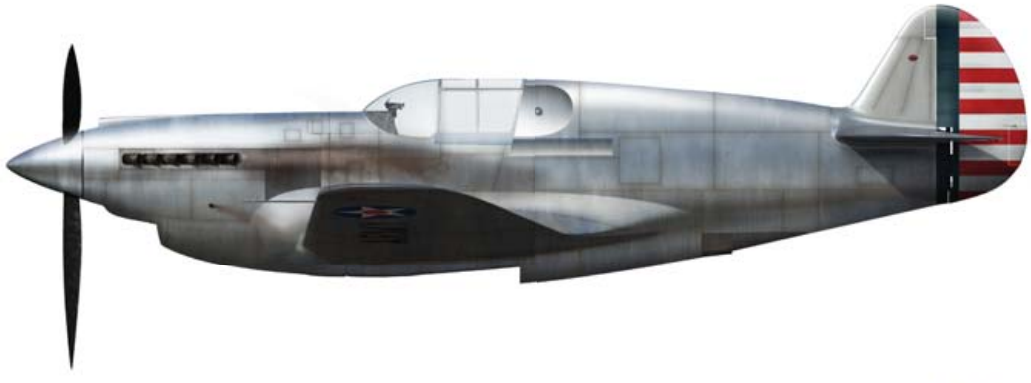

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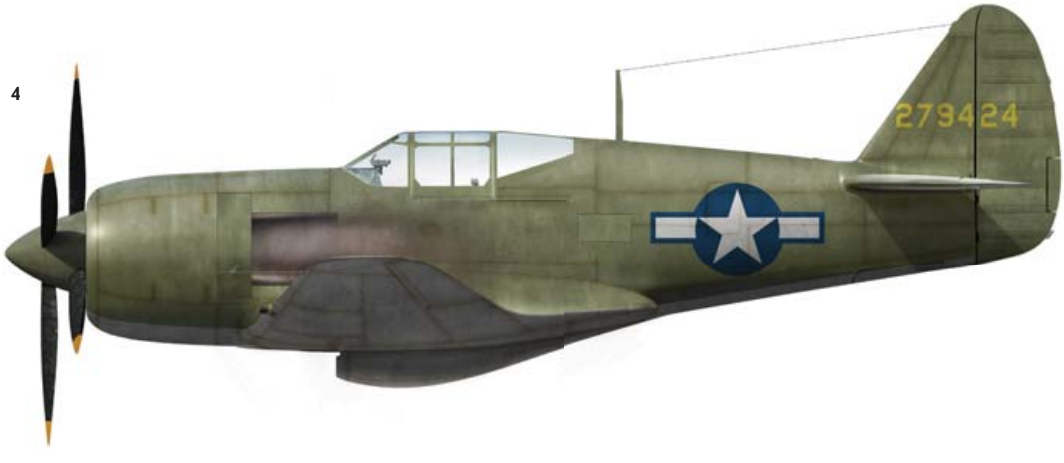

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The next challenge faced by Curtiss engineers was reducing the weight of the Warhawk. With each new version of the Hawk 87, more equipment and features were being added, and all of them made the plane heavier. Cutting weight would reduce the wing loading of the Warhawk, resulting in improved climb performance and maneuverability.

Unfortunately, most of the weight of the P-40 was engineered into its structure. This made the plane a tough customer, able to withstand extensive combat damage and continue to fly, but that meant the only way to cut weight was to take items out of the plane. This process began with the P-40L-1, which was envisioned as a lightweight P-40F. Two guns were removed from the wings, some armor plating was eliminated, and fuel capacity was reduced. The result was a savings of 90lb, but the cost in combat capability was obvious. Some 700 P-40Ls were built in five versions between January and May 1943.

Curtiss again took to eliminating equipment in an attempt to reduce weight in the Allison-powered P-40N-1. Like the L-1, it carried just four machine guns and had reduced fuel capacity of 120 gallons, but Curtiss went further by incorporating aluminum oil coolers and radiators. Another important change, very unpopular when the plane reached front-line units, was the removal of the battery and internal engine starter in favor of a hand crank. It was common practice among combat squadrons to fit P-40N-1s with batteries and starters from their parts stores and restore the planes to six-gun armament, largely negating the weight savings but adding to their usefulness. The P-40N-1 was the fastest Warhawk, with a top speed of 378mph at 10,500ft.

Further changes followed in the P-40N-5. Visibility out of the cockpit improved significantly by virtue of a new frameless sliding canopy and cut-down rear decking behind it covered by clear plastic. Full armament, plus external fuel tank and bomb fittings, was restored. Other features included a new pilot's seat, an SCR-696 radio, and smaller main landing gear wheels made of lightweight magnesium and lacking hubcaps. Curtiss went on to make seven further sub-versions of the P-40N, but all were virtually indistinguishable externally from the N-5 save for the serial number on the tail.

In all, Curtiss built 5,215 P-40Ns (Kittyhawk IV in RAF parlance) between March 1943 and November 1944, making it the most numerous Hawk model of all.

Curtiss made one further attempt to wring better performance out of the P-40, and even though the designers were successful in realizing substantial improvements, it was a case of too little, too late. In early 1943, engineers took a P-40K-10-CU (42-9987) back into the shop in Buffalo and reworked it into what would become the XP-40Q-1-CU. The plane had a needle nose, with the cooling system relocated into the wing roots. Later, the top of the fuselage was cut down, and a clear-vision bubble canopy replaced the old "birdcage" canopy enclosure. P-40K wings and tail surfaces remained. Two further P-40s, a K-1 (42-45722) and an N-25 (43-24571), were converted to XP-40Qs as the design team continued to refine the new version. In time, they clipped the wingtips and replaced a small air intake under the nose, creating a fighter bearing a remarkable resemblance to the P-51D Mustang.

Outwardly, the Packard V-1650 Merlin engine appeared quite similar to the Allison V-1710; but the Merlin's superior supercharger enabled the engine to deliver full power at higher altitudes than the Allison. Here, 33rd Fighter Group mechanics perform service on a P-40L at Paestum, Italy, October 1943. (Gordon Delp)

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A major improvement was under the engine cowling of the XP-40Qs, where a new Allison V-1710-121 resided. This engine, turning a four-bladed propeller out front, could produce 1,800hp in war emergency setting for short periods of time, and its two-stage supercharger allowed it to deliver 1,100hp at 25,000ft. As might be expected, performance improved accordingly: the XP-40Q attained a top speed of 422mph at 20,000ft.

In an attempt to improve lateral stability in the Hawk 87, Curtiss introduced a larger tail fin near the end of the P-40E-1 production run. The bigger tail carried over to the P-40K-1 and K-5. Here, Lt Ray Waynick of the 11th Fighter Squadron/343rd Fighter Group pilots P-40K-5 serial number 42-9791 over the Aleutian Islands in late 1942. (Jake Dixon)

The improved performance of the XP-40Q was not good enough to impress the Army brass, however. By the time the new Curtiss design was beginning flight testing, the USAAF was already placing orders for the Merlin-powered North American P-51B, which possessed not only superior speed and altitude capabilities but longer range as well. Production versions of the Lockheed P-38 Lightning and Republic P-47 Thunderbolt also were delivering performance equal to or better than the XP-40Q. No orders for the ultimate P-40 were forthcoming, and the long line of P-40s came to an end with a total of 13,736 produced.

American P-40 fighter ace Bruce K. Holloway had a chance to fly the XP-40Q at Eglin Field, Florida, late in the war after he completed his combat tour in China. He recalled the plane vividly in 1977:

> It was quite a bird ... It was a delight to fly and had performance that made you forget it was a P-40, but it was strictly a bread-board model that required several high-priced technicians to keep it in commission ... The principal enabling ingredient for this new hot rod was the engine. It had, among other things, a two-stage blower with an interstage carburetor. In other words, the carburetor was rammed by the first stage. Moreover, the second stage was driven through a liquid coupling with an aneroid control so as to maintain constant manifold pressure for any chosen throttle setting right on up to whatever altitude the air finally gave out.
>
> I have often wondered why Curtiss and Allison did not do something like this sooner ... In any event, the Q was too late and caused no ripples at all. As far as I know, it did not pick up a single zealot in uniform, which is highly unusual, but even if it had caught on there was a lot of work to do before it could be satisfactorily produced.

The P-40N/Kittyhawk IV combined a 20in. fuselage extension, Curtiss' ultimate fix for the stability problem, with a clear cockpit canopy and cut-down fuselage spine to improve visibility from the cockpit. "AVAGROG," Kittyhawk IV A29-614, flew in No. 84 Squadron, Royal Australian Air Force, at Labuan, North Borneo. (Craig Busby)

The first and third XP-40Qs were destroyed during flight testing. Curtiss eventually sold the second one after the war to race pilot Joe Zeigler for a few hundred dollars. He gave it the civil registration NX300B and planned to compete in air races as number 82. The plane was an unauthorized starter in the Thompson Trophy race of 1947, where it was running in the 13th lap when the engine failed and Ziegler bailed out; the aircraft crashed and exploded.

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The most radical design produced by Curtiss was the canard XP-55 Ascender. Development was lengthy and performance was disappointing; the plane failed to garner a production contract from the US Army. (Robert F. Dorr)

The Failures

As far back as 1939, Curtiss began developing new designs aimed at improving on the performance of its existing fighter types. Five years of trying produced no successful results, and throughout that time the US Army continued to buy P-40s.

The first attempt to replace the Hawk 81 was called the XP-46. The concept here was to adapt to the limited power output of the Allison V-1710 by building a smaller airframe than that of the Hawk 75/81. The idea might have made sense for Curtiss designers who had learned their craft building racers in the 1920s, but increasing wartime demands for heavy firepower, long range, and substantial armor protection made the XP-46 a guaranteed failure from the start. The high wing loading of the XP-46 limited its maneuverability and rate of climb, and its small fuel capacity gave it short range. When the prototype also failed to produce any speed advantage over the P-40, the project was scrapped.

The next try was the Hawk 88, designated XP-53 because it was funded by an Army contract. Larger than the XP-46, it was doomed by the failure of its engine, the Continental XIV-1430-3 inverted Vee, and never flew. Another project, the XP-55 Ascender, made it further into development. This futuristic-looking design had a canard configuration with a rear-mounted engine and propeller, a swept wing, and two vertical tails, but it also ultimately failed due to poor performance.

Attempting to take a shortcut toward a more successful fighter, Curtiss combined the laminar-flow wing design of the XP-53 with a P-40D fuselage and tail in 1940 to produce the first of many iterations of the XP-60, or Hawk 90. When this airframe was fitted with a Merlin engine, it produced an improvement in speed at altitude but with a loss of directional stability. Then the tinkering began, starting with a taller tail. This aircraft looked promising but was deemed too heavy, at 9,616lb, for the Merlin engine. Fitting a turbocharged Allison V-1710-75 required redesigning the fuselage, and the resultant XP-60A now bore almost no resemblance to the P-40. It was faster than the P-40, but the turbocharger was prone to catching fire. More development was needed, though the Army did place a production order for 1,950 P-60As.

By now it was early 1942, and with America's entry into the war the Army needed a lot of fighters in a hurry. To keep the Curtiss production lines churning, the order for P-60As was canceled in favor of building more P-40Ks and Ls. In addition, Curtiss got an order to build Republic P-47C Thunderbolts as the P-47G. Development of the P-60 series continued, however, as Curtiss tried various engine and propeller combinations to produce B, C, D, and E models. The final version, the YP-60E, featured a Pratt & Whitney R-2800-18 radial engine, a four-bladed propeller, and a bubble canopy. It finally flew in July 1944, but it produced a top speed of just 405mph at 24,500ft, well below the performance of the similar-looking Republic P-47D-25, which had been in production since the previous spring. Like the XP-40Q, the sole YP-60E was sold to an air racer after the war and crashed due to engine failure during the 1947 National Air Races.

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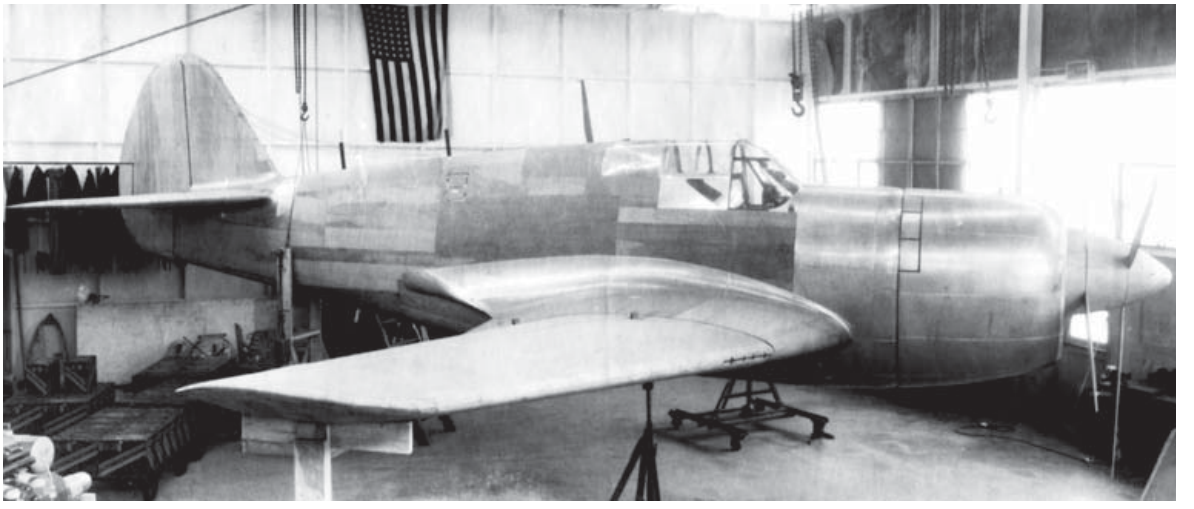

Curtiss responded to a 1941 Army specification for a heavily armed, high-altitude interceptor with the XP-62, seen here in mockup form. By the time Curtiss produced a flying prototype in 1943, the need for such a plane had waned and current types were fully capable of fulfilling the intended role. Again, no production orders were forthcoming. (Glenn H. Curtiss Museum, Hammondsport, NY)

The last gasp for Curtiss propeller-driven Army fighters was the XP-62, built in response to an Army request in mid-1941 for a heavily armed, high-altitude interceptor. Curtiss proposed building the XP-62, or Hawk 91, with a 2,300hp, turbocharged Wright R-3350-17 Double Cyclone radial engine driving contra-rotating propellers, packing eight 20mm cannons and featuring a pressurized cockpit.

The Army asked for various changes in the Curtiss proposal, including a reduction to four cannons, but issued an order for 100 P-62s in May 1942. Curtiss was already deeply involved in developing the P-60 at this time, and adding another aircraft for the design staff clearly caused both projects to suffer. Delays in the delivery of the cabin pressure system and necessary modifications to the R-3350-17 engine delayed the first flight until July 21, 1943. Again, Curtiss delivered too little too late. By that time, the need for an interceptor had passed, and the Army needed all the R-3350 engines it could get for a more promising project, the Boeing B-29 Superfortress. The order for P-62s was canceled. A similar project for the US Navy, the XF14C, also failed to win a production contract.

TECHNICAL SPECIFICATIONS

In roughly five years of producing the snub-nosed Hawk 87s, Curtiss created no fewer than 30 sub-versions, not including field conversions such as photo-reconnaissance ships and two-seat trainers. Like the long-nosed Hawk that preceded it, the Hawk 87 was continually modified to meet changing Army requirements. With each order for a new version of the P-40 came additional requirements expected to make the plane more combat-capable.

It says a lot about the original design that all these changes – including the introduction of an entirely different engine – never produced a substantial improvement in the performance of the aircraft. Top speed rose just 24mph from the slowest P-40E to the fastest P-40N-1. Critical altitude climbed from 15,000ft in the Allison-powered versions to 20,000ft in P-40s with Merlin engines, but remained far below that of contemporary fighters. Range actually decreased in the so-called lightweight versions when internal fuel tankage was reduced.

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P-40E fuselages share the floor with O-52 Owls in this shot of the Curtiss factory in Buffalo, New York, taken in 1941. Notice how the glazing already has been installed over the pre-painted coves behind the cockpit at this early stage of assembly. (Glenn H. Curtiss Museum, Hammondsport, NY)

The progression of modifications from the original P-40D through the ultimate P-40N-40 went as follows:

P-40D: Allison V-1710-39 engine; four .50-caliber machine guns in the wings
P-40E: Armament increased to six .50-caliber machine guns
P-40E-1: Wings strengthened to support heavier external loads; enlarged fin on last 500 aircraft
P-40F: Packard V-1650-1 Merlin engine
P-40F-5: Fuselage extended 20in. and vertical fin moved aft
P-40F-10: Manually actuated cowl flaps
P-40F-15: Winterized version for cold-weather operation
P-40F-20: Demand-type oxygen system introduced; vent window on left side of windshield
P-40K-1: As E-1, but with Allison V-1710-73 engine; flared exhaust stacks (most K models did not have windshield vent windows)
P-40K-5: rotary valve cooler added
P-40K-10: Fuselage extended 20in. and vertical fin moved aft; some aircraft winterized
P-40K-15: Winterized; emergency hydraulic system eliminated; battery moved forward
P-40L-1: Lightened P-40F with four wing guns; armor and fuel capacity reduced; vent window on left side of windshield
P-40L-5: Rocket fittings added
P-40L-10: Auxiliary fuel pump relocated; armor removed from coolant tank; several warning lights removed in cockpit; sway braces added for belly tank
P-40L-15: Permanent-type carburetor air filter; provision for interior signal light
P-40L-20: New SCR-695 radio; improved relays; incendiary grenade fitting
P-40M-1: Allison V-1710-81 engine; cooling grille in cowl forward of exhaust pipes; six wing guns
P-40M-5: Permanent carburetor air filter; reinforced ailerons
P-40M-10: Fuel pressure warning added; air vapor eliminator; visual landing gear indicator replaced warning horn
P-40N-1: Headrest armor restored; four wing guns; front wing tanks removed; aluminum oil coolers and radiator; starter replaced by manual crank
P-40N-5: Improved frameless canopy and fuselage cut out behind cockpit to improve rearward vision; smaller magnesium main wheels; SCR-696 radio; recognition lights; new pilot's seat; external bomb and fuel tank fittings restored; starter restored
P-40N-10: Winterized; manual oil dilution system; rate-of-climb indicator
P-40N-15: Larger wing tanks restored
P-40N-20: Allison V-1710-99 engine; provision to carry three 500lb bombs
P-40N-25: Non-metal self-sealing fuel tanks; minor internal changes; windshield vent window eliminated
P-40N-30: Minor equipment changes; some converted to two-seat TP-40N-30
P-40N-35: New radio mounting and ADF; minor instrument changes
P-40N-40: Allison V-1710-115 engine; automatic boost and propeller control; relocated armor; flame-suppressing exhaust stacks; new oxygen system

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Specifications

Army Hawk 87

H-87A-2/P-40D/Kittyhawk I	
Powerplant	Allison V-1710-39
– Rating at altitude	1,150hp at 11,800ft
– RPMs	3,000
– Compression ratio	6.65:1
Propeller	three-bladed constant speed; blade design No. 89301-3
Gross weight	7,740lb
Empty weight	5,970lb
Length	31ft 2in.
Airfoil	NACA 2215 at root tapering to NACA 2209 near tips
Wingspan	37ft 3.5in.
Wing area	236sq ft
Wing loading	32.80lb per sq. ft
Landing speed	85mph
Max speed at altitude	359mph at 15,000ft
Cruising speed	258mph
Service ceiling	30,600ft
Initial climb	2,580ft per min.
Range	1,150 miles
Armament	four Browning .50-caliber machine guns
Gun sight	N3
Production	582; July through December 1941
Serial numbers	40-359; 40-361 through 40-381; AK571 through AK999; AL100 through AL230 (P-40D 40-360 became the XP-40F)

H-87A-3/P-40E/Kittyhawk IA	
Powerplant	Allison V-1710-39
– Rating at altitude	1,150hp at 11,800ft
– RPMs	3,000
– Compression ratio	6.65:1
Propeller	three-bladed constant speed; blade design No. 89301-3
Gross weight	8,280lb
Empty weight	6,350lb
Length	31ft 2in.
Airfoil	NACA 2215 at root tapering to NACA 2209 near tips
Wingspan	37ft 3.5in.
Wing area	236sq ft
Wing loading	35.08lb per sq. ft
Landing speed	85mph
Max speed at altitude	354mph at 15,000ft
Cruising speed	258mph
Service ceiling	29,000ft
Initial climb	2,580ft per min.
Range	1,150 miles
Armament	Six Browning .50-caliber machine guns
Gun sight	N3
Production	820; August 1941 through May 1942
Serial numbers	40-358; 40-382 through 40-681; 41-5305 through 41-5744; 41-13521 through 41-13599

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AK 575, the fifth Kittyhawk I (Hawk 87-A2) of 560 delivered to the Royal Air Force, runs up at Speke on December 6, 1941. Identifying details of the Kittyhawk I, which was similar to the P-40D, include the straight exhaust pipes of its Allison V-1710-39 engine, armament of four .50-caliber wing guns, and the short tail. (Craig Busby)

H-87A-4/P-40E-1/Kittyhawk IA	
Powerplant	Allison V-1710-39
– Rating at altitude	1,150hp at 11,800ft
– RPMs	3,000
– Compression ratio	6.65:1
Propeller	three-bladed constant speed; blade design No. 89301-3
Gross weight	8,280lb
Empty weight	6,350lb
Length	31ft 2in.
Airfoil	NACA 2215 at root tapering to NACA 2209 near tips
Wingspan	37ft 3.5in.
Wing area	236sq ft
Wing loading	35.08lb per sq. ft
Landing speed	85mph
Max speed at altitude	354mph at 15,000ft
Cruising speed	258mph
Service ceiling	29,000ft
Initial climb	2,580ft per min.
Range	1,150 miles
Armament	Six Browning .50-caliber machine guns
Gun sight	N3
Production	1,500; December 1941 through May 1942
Serial numbers	41-24776 through 41-25195; 41-35874 through 41-36953

H-87B/P-40F & F-1 Warhawk/Kittyhawk II	
Powerplant	Packard V-1650-1 Merlin
– Rating at altitude	1,240hp at 11,800ft
– RPMs	3,000
– Compression ratio	6:1
Propeller	three-bladed constant speed; blade design No. 89301-3
Gross weight	8,500lb
Empty weight	6,590lb
Length	31ft 8.72in.
Airfoil	NACA 2215 at root tapering to NACA 2209 near tips
Wingspan	37ft 3.5in.
Wing area	236sq ft
Wing loading	36.02lb per sq. ft
Landing speed	82mph

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Max speed at altitude	364mph at 20,000ft
Cruising speed	290mph
Service ceiling	34,400ft
Initial climb	1,973ft per min.
Range	1,150 miles
Armament	Six Browning .50-caliber machine guns
Gun sight	N3
Production	699; January 1942 through August 1942*
Serial numbers	41-13600 through 41-13695; 41-13697 through 41-14299

H-87B/P-40F-5 Warhawk/Kittyhawk II	
Powerplant	Packard V-1650-1 Merlin
– Rating at altitude	1,240hp at 11,800ft
– RPMs	3,000
– Compression ratio	6:1
Propeller	three-bladed constant speed; blade design No. 89301-3
Gross weight	8,500lb
Empty weight	6,590lb
Length	33ft 4in.
Airfoil	NACA 2215 at root tapering to NACA 2209 near tips
Wingspan	37ft 3.5in.
Wing area	236sq. ft
Wing loading	36.02lb per sq. ft
Landing speed	82mph
Max speed at altitude	364mph at 20,000ft
Cruising speed	290mph
Service ceiling	34,400ft
Initial climb	1,973ft per min.
Range	1,150 miles
Armament	Six Browning .50-caliber machine guns
Gun sight	N3
Production	123; August 1942*
Serial numbers	41-14300 through 41-14422

H-87B/P-40F-10 Warhawk/Kittyhawk II	
Powerplant	Packard V-1650-1 Merlin
– Rating at altitude	1,240hp at 11,800ft
– RPMs	3,000
– Compression ratio	6:1
Propeller	three-bladed constant speed; blade design No. 89301-3
Gross weight	8,500lb
Empty weight	6,590lb
Length	33ft 4in.
Airfoil	NACA 2215 at root tapering to NACA 2209 near tips
Wingspan	37ft 3.5in.
Wing area	236sq. ft
Wing loading	36.02lb per sq. ft
Landing speed	82mph
Max speed at altitude	364mph at 20,000ft
Cruising speed	290mph
Service ceiling	34,400ft
Initial climb	1,973ft per min.
Range	1,150 miles
Armament	Six Browning .50-caliber machine guns
Gun sight	N3
Production	177; October through November 1942*
Serial numbers	41-14423 through 41-14599
* 70 P-40F, F-5, and F-10 completed with Allison V-1710-81 engines as P-40R-1	

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Looks can be deceiving. Though the serial number, 40-609, clearly identifies this as an early-production P-40E, the cooling grille in the forward cowling and the flared exhaust pipes suggest the plane has been re-engined with a late-model Allison V-1710-81. This was common practice in the Eleventh Air Force, where this old bird served with the 344th Fighter Squadron in the Aleutian Islands during 1944. (Gerry Baptiste)

H-87B/P-40F-15 Warhawk/Kittyhawk II	
Powerplant	Packard V-1650-1 Merlin
– Rating at altitude	1,240hp at 11,800ft
– RPMs	3,000
– Compression ratio	6:1
Propeller	three-bladed constant speed; blade design No. 89301-3
Gross weight	8,500lb
Empty weight	6,590lb
Length	33ft 4in.
Airfoil	NACA 2215 at root tapering to NACA 2209 near tips
Wingspan	37ft 3.5in.
Wing area	236sq. ft
Wing loading	36.02lb per sq. ft
Landing speed	82mph
Max speed at altitude	364mph at 20,000ft
Cruising speed	290mph
Service ceiling	34,400ft
Initial climb	1,973ft per min.
Range	1,150 miles
Armament	Six Browning .50-caliber machine guns
Gun sight	N3
Production	200; December 1942
Serial numbers	41-19733 through 41-19932

H-87B/P-40F-20 Warhawk/Kittyhawk II	
Powerplant	Packard V-1650-1 Merlin
– Rating at altitude	1,240hp at 11,800ft
– RPMs	3,000
– Compression ratio	6:1
Propeller	three-bladed constant speed; blade design No. 89301-3
Gross weight	8,500lb
Empty weight	6,590lb
Length	33ft 4in.
Airfoil	NACA 2215 at root tapering to NACA 2209 near tips
Wingspan	37ft 3.5in.
Wing area	236sq. ft
Wing loading	36.02lb per sq. ft

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Landing speed	82mph
Max speed at altitude	364mph at 20,000ft
Cruising speed	290mph
Service ceiling	34,400ft
Initial climb	1,973ft per min.
Range	1,150 miles
Armament	Six Browning .50-caliber machine guns
Gun sight	N3
Production	112; January 1943
Serial numbers	41-19933 through 41-20044

Hawk 87D/P-40K-1 Warhawk/Kittyhawk III	
Powerplant	Allison V-1710-73
– Rating at altitude	1,325hp at takeoff
– RPMs	3,000
– Compression ratio	6.65:1
Propeller	three-bladed constant speed; blade design No. 89301-3
Gross weight	8,400lb
Empty weight	6,400lb
Length	31ft 8.5in.
Airfoil	NACA 2215 at root tapering to NACA 2209 near tips
Wingspan	37ft 3.5in.
Wing area	236sq. ft
Wing loading	35.59lb per sq. ft
Landing speed	82mph
Max speed at altitude	362mph at 15,000ft
Cruising speed	290mph
Service ceiling	28,000ft
Initial climb	2,000ft per min.
Range	700 miles
Armament	Six Browning .50-caliber machine guns
Gun sight	N3
Production	600; May through August 1942
Serial numbers	42-45722 through 42-46321

Hawk 87D/P-40K-5 Warhawk/Kittyhawk III	
Powerplant	Allison V-1710-73
– Rating at altitude	1,325hp at takeoff
– RPMs	3,000
– Compression ratio	6.65:1
Propeller	three-bladed constant speed; blade design No. 89301-3
Gross weight	8,400lb
Empty weight	6,400lb
Length	31ft 8.5in.
Airfoil	NACA 2215 at root tapering to NACA 2209 near tips
Wingspan	37ft 3.5in.
Wing area	236sq. ft
Wing loading	35.59lb per sq. ft
Landing speed	82mph
Max speed at altitude	362mph at 15,000ft
Cruising speed	290mph
Service ceiling	28,000ft
Initial climb	2,000ft per min.
Range	700 miles
Armament	Six Browning .50-caliber machine guns
Gun sight	N3
Production	200; September 1942
Serial numbers	42-9730 through 42-9929

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Hawk 87D/P-40K-10 Warhawk/Kittyhawk III	
Powerplant	Allison V-1710-73
– Rating at altitude	1,325hp at takeoff
– RPMs	3,000
– Compression ratio	6.65:1
Propeller	three-bladed constant speed; blade design No. 89301-3
Gross weight	8,400lb
Empty weight	6,400lb
Length	33ft 4in.
Airfoil	NACA 2215 at root tapering to NACA 2209 near tips
Wingspan	37ft 3.5in.
Wing area	236sq. ft
Wing loading	35.59lb per sq. ft
Landing speed	82mph
Max speed at altitude	362mph at 15,000ft
Cruising speed	290mph
Service ceiling	28,000ft
Initial climb	2,000ft per min.
Range	700 miles
Armament	Six Browning .50-caliber machine guns
Gun sight	N3
Production	335; October through November 1942
Serial numbers	42-9930 through 42-10264

Hawk 87D/P-40K-15 Warhawk/Kittyhawk III	
Powerplant	Allison V-1710-73
– Rating at altitude	1,325hp at takeoff
– RPMs	3,000
– Compression ratio	6.65:1
Propeller	three-bladed constant speed; blade design No. 89301-3
Gross weight	8,400lb
Empty weight	6,400lb
Length	33ft 4in.
Airfoil	NACA 2215 at root tapering to NACA 2209 near tips
Wingspan	37ft 3.5in.
Wing area	236sq. ft
Wing loading	35.59lb per sq. ft
Landing speed	82mph
Max speed at altitude	362mph at 15,000ft
Cruising speed	290mph
Service ceiling	28,000ft
Initial climb	2,000ft per min.
Range	700 miles
Armament	Six Browning .50-caliber machine guns
Gun sight	N3
Production	165; November 1942
Serial numbers	42-10265 through 42-10429

Hawk 87B/P-40L-1 Warhawk/Kittyhawk II	
Powerplant	Packard V-1650-1 Merlin
– Rating at altitude	1,240hp at 11,800ft
– RPMs	3,000
– Compression ratio	6:1
Propeller	three-bladed constant speed; blade design No. 89301-3
Gross weight	8,080lb
Empty weight	6,480lb

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Length	33ft 4in.
Airfoil	NACA 2215 at root tapering to NACA 2209 near tips
Wingspan	37ft 3.5in.
Wing area	236sq. ft
Wing loading	34.24lb per sq. ft
Landing speed	82mph
Max speed at altitude	370mph at 20,000ft
Cruising speed	250mph
Service ceiling	34,400ft
Initial climb	3,300ft per min.
Range	650 miles
Armament	Four Browning .50-caliber machine guns
Gun sight	N3
Production	50; January 1943
Serial numbers	42-10430 through 42-10479

Hawk 87D/P-40L-5 Warhawk/Kittyhawk II	
Powerplant	Packard V-1650-1 Merlin
– Rating at altitude	1,240hp at 11,800ft
– RPMs	3,000
– Compression ratio	6:1
Propeller	three-bladed constant speed; blade design No. 89301-3
Gross weight	8,080lb
Empty weight	6,480lb
Length	33ft 4in.
Airfoil	NACA 2215 at root tapering to NACA 2209 near tips
Wingspan	37ft 3.5in.
Wing area	236sq. ft
Wing loading	34.24lb per sq. ft
Landing speed	82mph
Max speed at altitude	370mph at 20,000ft
Cruising speed	250mph
Service ceiling	34,400ft

Operation of the complex landing gear retraction system is clearly visible in this shot of two P-40Fs taking off at an airfield in Egypt during early 1943. Note how the starboard wheel is coming up first in the lead plane, while the port wheel is doing so in the second P-40. (Molesworth collection)

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Initial climb	3,300ft per min.
Range	650 miles
Armament	Four Browning .50-caliber machine guns
Gun sight	N3
Production	220; January through February 1943**
Serial numbers	42-10480 through 42-10699

Hawk 87D/P-40L-10 Warhawk/Kittyhawk II	
Powerplant	Packard V-1650-1 Merlin
– Rating at altitude	1,240hp at 11,800ft
– RPMs	3,000
– Compression ratio	6:1
Propeller	three-bladed constant speed; blade design No. 89301-3
Gross weight	8,080lb
Empty weight	6,480lb
Length	33ft 4in.
Airfoil	NACA 2215 at root tapering to NACA 2209 near tips
Wingspan	37ft 3.5in.
Wing area	236sq. ft
Wing loading	34.24lb per sq. ft
Landing speed	82mph
Max speed at altitude	370mph at 20,000ft
Cruising speed	250mph
Service ceiling	34,400ft
Initial climb	3,300ft per min.
Range	650 miles
Armament	Four Browning .50-caliber machine guns
Gun sight	N3
Production	148; February through March 1943**
Serial numbers	42-10700 through 42-10847

Hawk 87D Warhawk/P-40L-15/Kittyhawk II	
Powerplant	Packard V-1650-1 Merlin
– Rating at altitude	1,240hp at 11,800ft
– RPMs	3,000
– Compression ratio	6:1
Propeller	three-bladed constant speed; blade design No. 89301-3
Gross weight	8,080lb
Empty weight	6,480lb
Length	33ft 4in.
Airfoil	NACA 2215 at root tapering to NACA 2209 near tips
Wingspan	37ft 3.5in.
Wing area	236sq. ft
Wing loading	34.24lb per sq. ft
Landing speed	82mph
Max speed at altitude	370mph at 20,000ft

C

ALEUTIANS P-40K, 1943

Externally, the P-40K-1 and K-5 were identical to the late-model P-40E-1, which introduced an enlarged vertical tail and flared exhaust pipes. The bigger tail was intended to cure the Warhawk's directional stability problem, which otherwise would have been worse in the P-40K due to its more powerful Allison V-1710-73, rated at 1,325hp for takeoff. Pilots noted little, if any, improvement in the P-40K's handling characteristics. This P-40K-1 was assigned to the 18th Fighter Squadron/343rd Fighter Group, based on Attu in the Aleutian Islands during late 1943. P-40s flew operationally in the Aleutians from the spring of 1942 until the closing weeks of the war.

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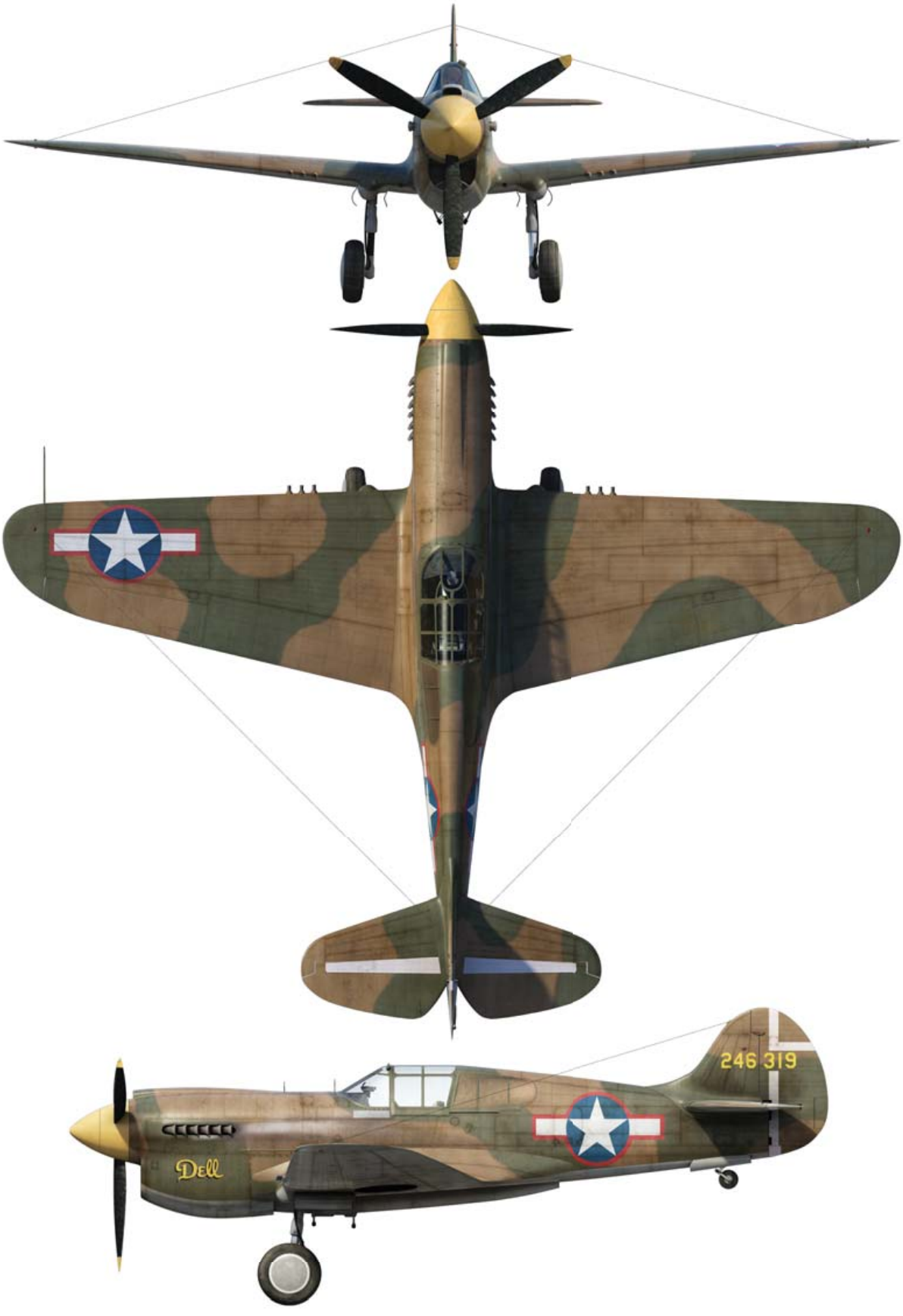

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Cruising speed	250mph
Service ceiling	34,400ft
Initial climb	3,300ft per min.
Range	650 miles
Armament	Four Browning .50-caliber machine guns
Gun sight	N3
Production	112; March through April 1943**
Serial numbers	42-10848 through 42-10959

Hawk 87D/P-40L-20 Warhawk/Kittyhawk II	
Powerplant	Packard V-1650-1 Merlin
– Rating at altitude	1,240hp at 11,800ft
– RPMs	3,000
– Compression ratio	6:1
Propeller	three-bladed constant speed; blade design No. 89301-3
Gross weight	8,080lb
Empty weight	6,480lb
Length	33ft 4in.
Airfoil	NACA 2215 at root tapering to NACA 2209 near tips
Wingspan	37ft 3.5in.
Wing area	236sq. ft
Wing loading	34.24lb per sq. ft
Landing speed	82mph
Max speed at altitude	370mph at 20,000ft
Cruising speed	250mph
Service ceiling	34,400ft
Initial climb	3,300ft per min.
Range	650m
Armament	Four Browning .50-caliber machine guns
Gun sight	N3
Production	170; April 1943**
Serial numbers	42-10960 through 42-11129
** 53 P-40L-5, L-10, L-15, and L-20 completed with Allison V-1710-81 engines as P-40R-2	

Hawk 87B/P-40M-1 Warhawk	
Powerplant	Allison V-1710-81
– Rating at altitude	1,125hp at 14,600ft
– RPMs	3,000
– Compression ratio	6.65:1
Propeller	three-bladed constant speed; blade design No. 89303-24
Gross weight	8,400lb
Empty weight	6,464lb
Length	33ft 4in.
Airfoil	NACA 2215 at root tapering to NACA 2209 near tips
Wingspan	37ft 3.5in.
Wing area	236sq. ft
Wing loading	35.59lb per sq. ft
Landing speed	82mph
Max speed at altitude	360mph at 20,000ft
Cruising speed	272mph
Service ceiling	30,000ft
Initial climb	2,050ft per min.
Range	700 miles
Armament	Six Browning .50-caliber machine guns
Gun sight	N3
Production	60; November 1942
Serial numbers	43-5403 through 43-5462

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Ground crewmen Art Stahl and Glen Mortenson pose with P-40M "Margie" of the` 26th Fighter Squadron/51st Fighter Group in China, 1944. Lt Billie Clark was the pilot. Note the ring and bead manual gun sight on the cowling, a common feature on P-40D–K models but unusual to see on a P-40M. (Francis Hirschert)

Hawk 87B/P-40M-5 Warhawk/Kittyhawk III	
Powerplant	Allison V-1710-81
– Rating at altitude	1,125hp at 14,600ft
– RPMs	3,000
– Compression ratio	6.65:1
Propeller	three-bladed constant speed; blade design No. 89303-24
Gross weight	8,400lb
Empty weight	6,464lb
Length	33ft 4in.
Airfoil	NACA 2215 at root tapering to NACA 2209 near tips
Wingspan	37ft 3.5in.
Wing area	236sq. ft
Wing loading	35.59lb per sq. ft
Landing speed	82mph
Max speed at altitude	360mph at 20,000ft
Cruising speed	272mph
Service ceiling	30,000ft
Initial climb	2,050ft per min.
Range	700 miles
Armament	Six Browning .50-caliber machine guns
Gun sight	N3
Production	260; November through December 1942
Serial numbers	43-5463 through 43-5722

Hawk 87B/P-40M-10 Warhawk/Kittyhawk III	
Powerplant	Allison V-1710-81
– Rating at altitude	1,125hp at 14,600ft
– RPMs	3,000
– Compression ratio	6.65:1
Propeller	three-bladed constant speed; blade design No. 89303-24
Gross weight	8,400lb
Empty weight	6,464lb
Length	33ft 4in.
Airfoil	NACA 2215 at root tapering to NACA 2209 near tips
Wingspan	37ft 3.5in.
Wing area	236sq. ft
Wing loading	35.59lb per sq. ft
Landing speed	82mph

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In an effort to reduce weight, Curtiss deleted the two outboard wing guns, among other changes, in the P-40N-1. This example, No. 179 of the 75th Fighter Squadron/23rd Fighter Group, was piloted by Lt J. L. "Shorty" Lee in China during 1943. The windshield vent window was standard in this version of the Warhawk. (James L. Lee)

Max speed at altitude	360mph at 20,000ft
Cruising speed	272mph
Service ceiling	30,000ft
Initial climb	2,050ft per min.
Range	700 miles
Armament	Six Browning .50-caliber machine guns
Gun sight	N3
Production	280; January through February 1943
Serial numbers	43-5723 through 43-6002

H-87V/P-40N-1 Warhawk/Kittyhawk IV	
Powerplant	Allison V-1710-81
– Rating at altitude	1,125hp at 14,600ft
– RPMs	3,000
– Compression ratio	6.65:1
Propeller	three-bladed constant speed; blade design No. 89303-24
Gross weight	7,400lb
Empty weight	6,000lb
Length	33ft 4in.
Airfoil	NACA 2215 at root tapering to NACA 2209 near tips
Wingspan	37ft 3.5in.
Wing area	236sq. ft
Wing loading	31.36lb per sq. ft
Landing speed	82mph
Max speed at altitude	378mph at 10,500ft

D

P-40N-5

Curtiss built more P-40Ns (Kittyhawk IV in RAF service) than any other model of the Warhawk. The N-5 introduced a revised canopy and cockpit glazing for improved visibility. No. 634 of the 28th Fighter Squadron/3rd Fighter Group was one of the initial complement of new P-40s assigned to the Chinese-American Composite Wing when it went into action at Kweilin, China, in December 1943. It is shown here as it looked in January 1944, a month before Chinese Air Force fuselage roundels and rudder stripes were applied. Its pilot, 1/Lt James "Corky" Bush, completed 24 missions before he was shot down and killed on May 27, 1944, when he was jumped by Japanese fighters at low level during a strafing mission. No. 634 survived until August 1944, when it, too, was shot down.

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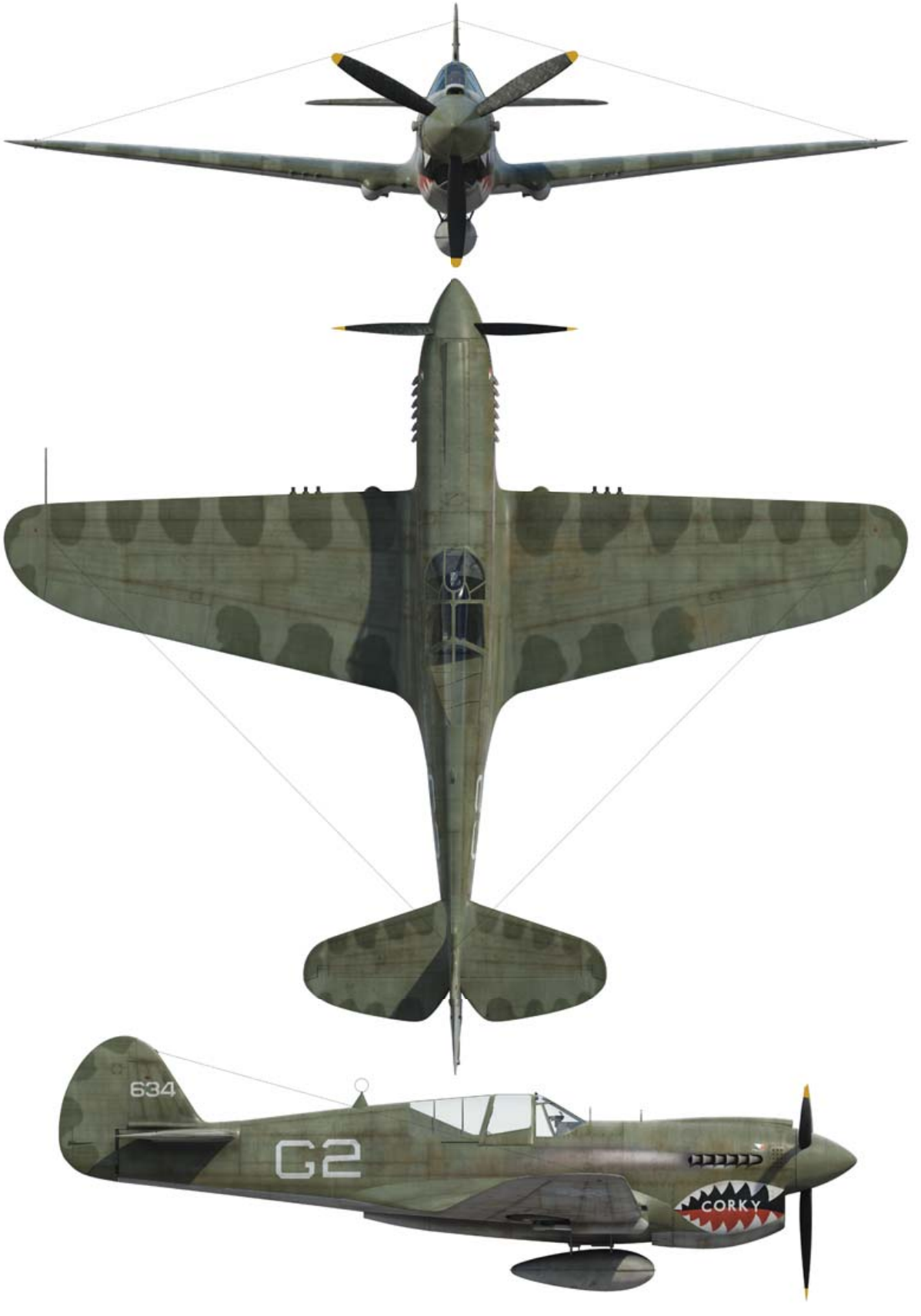

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Cruising speed	288mph
Service ceiling	38,000ft
Initial climb	2,239ft per min.
Range	750 miles
Armament	Four Browning .50-caliber machine guns
Gun sight	N3
Production	400; March through April 1943
Serial numbers	42-104429 through 42-104828

H-87W/P-40N-5 Warhawk/Kittyhawk IV	
Powerplant	Allison V-1710-81
– Rating at altitude	1,125hp at 14,500ft
– RPMs	3,000
– Compression ratio	6.65:1
Propeller	three-bladed constant speed; blade design No. 89303-24
Gross weight	8,350lb
Empty weight	6,200lb
Length	33ft 4in.
Airfoil	NACA 2215 at root tapering to NACA 2209 near tips
Wingspan	37ft 3.5in.
Wing area	236sq. ft
Wing loading	35.38lb per sq. ft
Landing speed	82mph
Max speed at altitude	343mph at 15,000ft
Cruising speed	263mph
Service ceiling	31,000ft
Initial climb	2,120ft per min.
Range	750 miles
Armament	Six Browning .50-caliber machine guns
Gun sight	N3
Production	1,100; May through July 1943
Serial numbers	42-104829 through 42-105928

H-87W/P-40N-10 IV Warhawk/Kittyhawk	
Powerplant	Allison V-1710-81
– Rating at altitude	1,125hp at 14,500ft
– RPMs	3,000
– Compression ratio	6.65:1
Propeller	three-bladed constant speed; blade design No. 89303-24
Gross weight	8,350lb
Empty weight	6,200lb
Length	33ft 4in.
Airfoil	NACA 2215 at root tapering to NACA 2209 near tips
Wingspan	37ft 3.5in.
Wing area	236sq. ft
Wing loading	35.38lb per sq. ft
Landing speed	82mph
Max speed at altitude	343mph at 15,000ft
Cruising speed	263mph
Service ceiling	31,000ft
Initial climb	2,120ft per min.
Range	750 miles
Armament	Six Browning .50-caliber machine guns
Gun sight	N3
Production	100; August 1943
Serial numbers	42-105929 through 42-106028

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Lt Kenneth "Bud" Pool poses with a P-40N-5 of the 35th Fighter Squadron/8th Fighter Group in New Guinea, late 1943. Note the smaller, magnesium main landing gear wheel that debuted on this model. (John Stanaway)

H-87W/P-40N-15 IV Warhawk/Kittyhawk	
Powerplant	Allison V-1710-81
– Rating at altitude	1,125hp at 14,500ft
– RPMs	3,000
– Compression ratio	6.65:1
Propeller	three-bladed constant speed; blade design No. 89303-24
Gross weight	8,350lb
Empty weight	6,200lb
Length	33ft 4in.
Airfoil	NACA 2215 at root tapering to NACA 2209 near tips
Wingspan	37ft 3.5in.
Wing area	236sq. ft
Wing loading	35.38lb per sq. ft
Landing speed	82mph
Max speed at altitude	343mph at 15,000ft
Cruising speed	263mph
Service ceiling	31,000ft
Initial climb	2,120ft per min.
Range	750 miles
Armament	Six Browning .50-caliber machine guns
Gun sight	N3
Production	377; September 1943
Serial numbers	42-106029 through 42-106405

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An improved-vision "greenhouse" over the cockpit debuted in the P-40N-5. The fairing behind the pilot in this Warhawk, a squadron hack in the 75th Fighter Squadron/23rd Fighter Group, has been removed to allow installation of a second seat. (Bill Mahannah)

H-87W/P-40N-20 Warhawk/Kittyhawk IV	
Powerplant	Allison V-1710-99
– Rating at altitude	1,360hp at takeoff
– RPMs	3,000
– Compression ratio	6.65:1
Propeller	three-bladed constant speed; blade design No. 89303-24
Gross weight	8,350lb
Empty weight	6,200lb
Length	33ft 4in.
Airfoil	NACA 2215 at root tapering to NACA 2209 near tips
Wingspan	37ft 3.5in.
Wing area	236sq. ft
Wing loading	35.38lb per sq. ft
Landing speed	82mph
Max speed at altitude	350mph at 16,400ft
Cruising speed	290mph
Service ceiling	31,000ft
Initial climb	1,918ft per min.
Range	750 miles
Armament	Six Browning .50-caliber machine guns
Gun sight	N3
Production	1,523; September through December 1943
Serial numbers	42-106406 through 42-106428; 43-22752 through 43-24251

H-87W/P-40N-25 Warhawk/Kittyhawk IV	
Powerplant	Allison V-1710-99
– Rating at altitude	1,360hp at takeoff
– RPMs	3,000
– Compression ratio	6.65:1
Propeller	three-bladed constant speed; blade design No. 89303-24

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Gross weight	8,350lb
Empty weight	6,200lb
Length	33ft 4in.
Airfoil	NACA 2215 at root tapering to NACA 2209 near tips
Wingspan	37ft 3.5in.
Wing area	236sq. ft
Wing loading	35.38lb per sq. ft
Landing speed	82mph
Max speed at altitude	350mph at 16,400ft
Cruising speed	290mph
Service ceiling	31,000ft
Initial climb	1,918ft per min.
Range	750 miles
Armament	Six Browning .50-caliber machine guns
Gun sight	N3
Production	499; January and February 1944
Serial numbers	43-24252 through 43-24570; 43-24572 through 43-24751

H-87W/P-40N-30 Warhawk/Kittyhawk IV	
Powerplant	Allison V-1710-99
– Rating at altitude	1,360hp at takeoff
– RPMs	3,000
– Compression ratio	6.65:1
Propeller	three-bladed constant speed; blade design No. 89303-24
Gross weight	8,350lb
Empty weight	6,200lb
Length	33ft 4in.
Airfoil	NACA 2215 at root tapering to NACA 2209 near tips
Wingspan	37ft 3.5in.
Wing area	236sq. ft
Wing loading	35.38lb per sq. ft
Landing speed	82mph
Max speed at altitude	350mph at 16,400ft
Cruising speed	290mph
Service ceiling	31,000ft
Initial climb	1,918ft per min.
Range	750 miles
Armament	Six Browning .50-caliber machine guns
Gun sight	N3
Production	500; July through September 1944
Serial numbers	44-7001 through 44-7500

H-87W/P-40N-35 Warhawk/Kittyhawk IV	
Powerplant	Allison V-1710-99
– Rating at altitude	1,360hp at takeoff
– RPMs	3,000
– Compression ratio	6.65:1
Propeller	three-bladed constant speed; blade design No. 89303-24
Gross weight	8,350lb
Empty weight	6,200lb
Length	33ft 4in.
Airfoil	NACA 2215 at root tapering to NACA 2209 near tips
Wingspan	37ft 3.5in.
Wing area	236sq. ft
Wing loading	35.38lb per sq. ft
Landing speed	82mph
Max speed at altitude	350mph at 16,400ft
Cruising speed	290mph

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Service ceiling	31,000ft
Initial climb	1,918ft per min.
Range	750 miles
Armament	Six Browning .50-caliber machine guns
Gun sight	N3
Production	500; July through September 1944
Serial numbers	44-7501 through 44-8000

H-87W/P-40N-40 Warhawk/Kittyhawk IV	
Powerplant	Allison V-1710-99
– Rating at altitude	1,360hp at takeoff
– RPMs	3,000
– Compression ratio	6.65:1
Propeller	three-bladed constant speed; blade design No. 89303-24
Gross weight	8,350lb
Empty weight	6,200lb
Length	33ft 4in.
Airfoil	NACA 2215 at root tapering to NACA 2209 near tips
Wingspan	37ft 3.5in.
Wing area	236sq. ft
Wing loading	35.38lb per sq. ft
Landing speed	82mph
Max speed at altitude	350mph at 16,400ft
Cruising speed	290mph
Service ceiling	31,000ft
Initial climb	1,918ft per min.
Range	750m
Armament	Six Browning .50-caliber machine guns
Gun sight	N3
Production	216; October through November 1944
Serial numbers	44-47749 through 44-47964

XP-40Q-2 Warhawk	
Powerplant	Allison V-1710-101-F-27R
– Rating at altitude	1,425hp at takeoff; 1,100hp at 25,000ft
– RPMs	3,000
– Compression ratio	6.65:1
Propeller	four-bladed Curtiss Electric
Gross weight	8,203lb
Empty weight	unknown
Length	35ft 4in.
Airfoil	NACA 2215 at root tapering to NACA 2209 near tips
Wingspan	35ft 3in.
Wing area	approximately 230sq. ft
Wing loading	35.67lb per sq. ft
Landing speed	82mph
Max speed at altitude	422mph at 20,000ft
Cruising speed	approximately 290mph
Service ceiling	39,000ft
Initial climb	4,167ft per min.
Range	unknown
Armament	Four Browning .50-caliber machine guns
Gun sight	unknown
Production	1; early 1945 (two others built but not delivered to the USAAF)
Serial number	43-24571

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USAAF Experimental Models

XP-46-CU	
Powerplant	Allison V-1710-39
– Rating at altitude	1,150hp at 11,800ft
– RPMs	3,000
– Compression ratio	6.65:1
Propeller	three-bladed constant speed; blade design No. 89301-3
Gross weight	7,322lb
Empty weight	5,625lb
Length	30ft 2in.
Wingspan	34ft 4in.
Wing area	208sq. ft
Wing loading	35.20lb per sq. ft
Landing speed	79mph
Max speed at altitude	355mph at 12,200ft
Service ceiling	29,500ft
Initial climb	2,460ft per min.
Range	325 miles
Armament	Two Browning .50-caliber machine guns; up to eight Browning .30-caliber machine guns
Landing gear	retractable
Production	2; February 1941
Serial numbers	40-3053 and 40-3054

The 45th Fighter Squadron replaced the wheels on its new P-40N-5s with larger wheels off P-40E/Ks when the squadron deployed to the Marshall Islands in 1943, because the crushed coral runways were hard on tires, and spare tires for the new wheels were not yet available. Also visible are the plywood sway braces used to stabilize wing-mounted bombs and an experimental rocket launcher, which proved unsuccessful. (Jack Lambert)

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CW-24/XP-55-CU Ascender	
Powerplant	Allison V-1710-95
– Rating at altitude	1,275hp at takeoff
– RPMs	3,000
– Compression ratio	6.65:1
Propeller	three-bladed Curtiss Electric
Gross weight	7,931lb
Empty weight	6,354lb
Length	29ft 7in.
Wingspan	41ft
Wing area	235sq. ft
Wing loading	33.75lb per sq. ft
Landing speed	80mph
Max speed at altitude	390mph at 19,300ft
Cruising speed	296mph
Service ceiling	36,200ft
Initial climb	2,460ft per min.
Range	635 miles
Armament	Four Browning .50-caliber machine guns
Gun sight	unknown
Landing gear	retractable tricycle
Production	3; April 1944
Serial numbers	42-78845 through 42-78847

H-95C/XP-60C-CU	
Powerplant	Pratt & Whitney R-2800-53
– Rating at altitude	2,000hp at 20,000ft
– RPMs	2,700
– Compression ratio	6.8:1
Propeller	twin three-bladed, contra-rotating
Gross weight	10,525lb
Empty weight	8,600lb
Length	33ft 11in.
Airfoil	Laminar flow
Wingspan	41ft 4in.
Wing area	275sq. ft
Wing loading	31.27lb per sq. ft
Landing speed	89mph
Max speed at altitude	414mph at 20,350ft
Cruising speed	315mph
Service ceiling	37,900ft
Initial climb	3,890ft per min.
Range	315 miles
Armament	Four Browning .50-caliber machine guns
Gun sight	unknown
Landing gear	retractable
Production	1; April 1943
Serial number	42-79424

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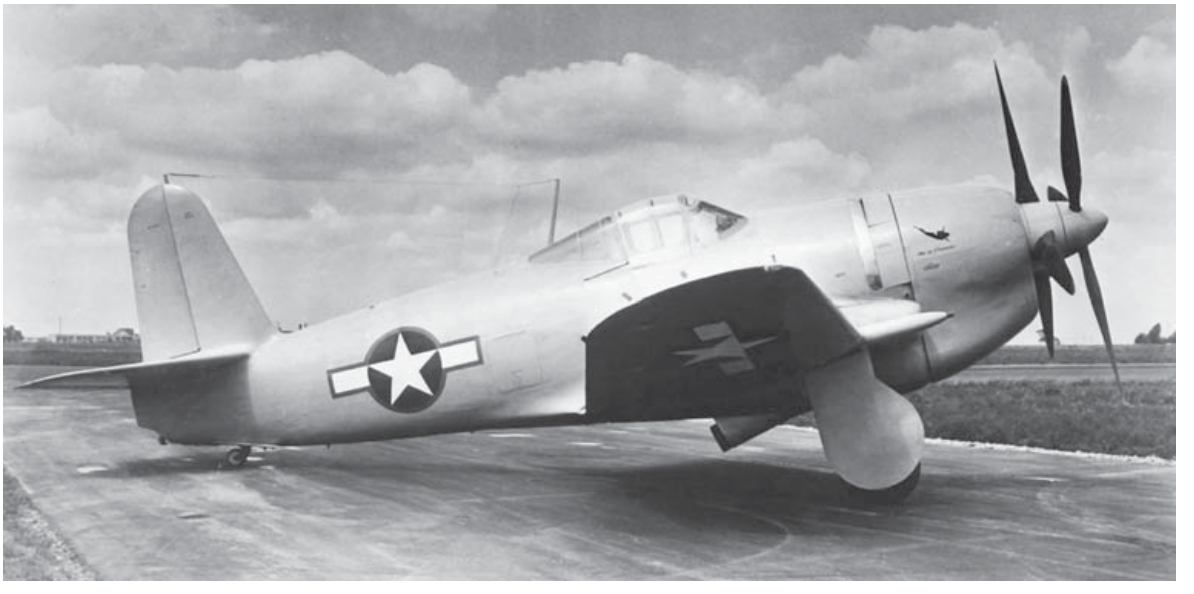
The XP-60C looked like a winner, with its powerful Pratt & Whitney R-2800-53 twin-radial engine and six-bladed, contra-rotating propeller. But despite featuring a laminar- flow wing carried over from the XP-53, the plane managed a top speed of just 414mph and failed to win a production contract. (Glenn H. Curtiss Museum, Hammondsport, NY)

The Fighters of 1942

Type	*Max Weight*	*Top Speed*	*Service Ceiling*	*Range*
P-40E/K	9,200lb	362mph	28,000ft	730 miles
P-40F	9,350lb	364mph	34,400ft	730 miles
P-38F	18,000lb	395mph	39,000ft	650 miles
P-39K	8,400lb	368mph	33,300ft	750 miles
Bf 109G	5,523lb	354mph	36,000ft	412 miles
FW 190A-8	10,800lb	408mph	37,400ft	500 miles
MC.202	6,636lb	370mph	37,730ft	475 miles
A6M2	5,313lb	316mph	33,790ft	1,165 miles
Ki-43-1a	5,695lb	308mph	38,500ft	745 miles
Hurricane IIA	7,300lb	342mph	36,300ft	480 miles
Spitfire IX	7,500lb	416mph	45,000ft	500 miles
LaGG-3	6,316lb	352mph	33,464ft	400 miles
MiG-3	7,390lb	397mph	39,369ft	776 miles
Yak-1	6,217lb	363mph	32,808ft	528 miles

Curtiss also was unsuccessful at developing a fighter for the US Navy. The XF14C-2, seen here in November 1945, featured a Wright R-3350 engine driving a Curtiss Electric contra-rotating propeller. (Bob Dorr)



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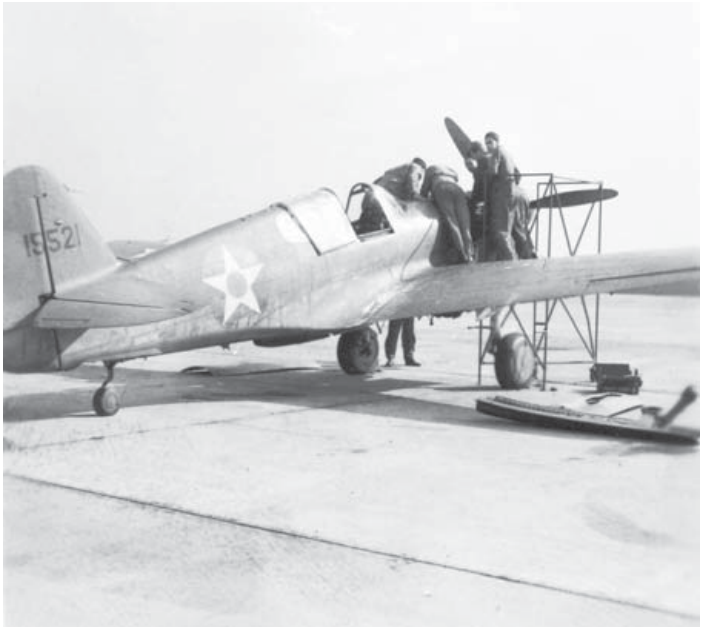

Five technicians of the 64th Pursuit Squadron/57th Pursuit Group work on the engine of P-40E-CU 41-5521 at Bradley Field, Connecticut, in early 1942. The 57th was one of the first USAAF stateside units to fly the P-40E. (New England Air Museum)

OPERATIONAL HISTORY

Stateside Duty

Curtiss delivered its first snub-nosed Hawks, 22 P-40Ds, to the US Army in July 1941 and kept one in Buffalo to convert into the XP-40F. Deliveries of 820 P-40Es, which was essentially the same airplane as the P-40D but with the armament increased from four wing guns to six, began the following month and continued into May 1942.

The P-40Ds initially were assigned to stateside pursuit groups such as the 20th, 51st, and 57th, which in the months prior to the Pearl Harbor attack were furiously training for combat. Several of these aircraft were transferred in early 1942 to the 15th Pursuit Group in Hawaii, where they continued in the training role for many months; and at least one P-40D, serial number 40-361, flew operationally with the 11th Fighter Squadron in the Aleutian Islands.

Virtually every subsequent model of the snub-nosed Hawk followed the P-40D into training duties around the United States. Initially, they were assigned to first-line combat squadrons preparing for overseas service while providing air defense for areas such as coastal cities deemed vulnerable to attack from the sea and industrial centers in the Midwest. As the war progressed and tour-expired combat veterans became available in mid-1943 to provide operational training to new pilots just out of flight school, P-40s did yeoman duty in replacement training units. These units typically flew from airfields across the southern tier of the nation, where warmer temperatures and better weather helped expedite training schedules.

One of the thousands of USAAF pilots who trained on the P-40 prior to flying combat overseas was John W. Wheeler, who would serve in China with the 74th Fighter Squadron/23rd Fighter Group in 1944. He recalled his introduction to the P-40 in a letter to the author:

> The first time I encountered a P-40 was at Aloe Field in Vernon, Texas. They had a few there and they gave the pilots that had gotten the best gunnery scores in the AT-6 about 10 hours of P-40 time before graduation from Cadet Corps. That was quite an experience. It was a completely different breed than a trainer. We had several hours to get acquainted with the cockpit, and as you sat on the ground, the wing was right under your parachute cushion. It felt as though you could reach out and touch the wingtips.
>
> The engine was long and rose up in front to block out all forward visibility. You were supposed to keep 1500 RPM at all times on the ground or the spark plugs were apt to foul. You had to taxi by S-ing along the taxi strip so you could see ahead, first on one side then on the other.
>
> On my first flight in it, I did a chandelle after a few preliminary maneuvers. I blacked myself out cold, the first and only time that ever happened to me. The P-40 was a good, honest airplane, although you must realize it was obsolete early in the war.

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> It was slow, had relatively short range without auxiliary tanks and couldn't get higher than about 25,000 feet with the loads we carried. It was strong and reliable, had a cockpit built for a big man, and it took a big man to get the most out of it. Many a day I would land, after a hard day of dogfighting during training, with an aching arm from the work of maneuvering. And I was a big man!

A pilot of the 15th Tactical Reconnaissance Squadron taxies P-40N No. 47E while participating in the Tennessee training maneuvers during September 1943 as a member of "Red Force." Note what appears to be a camera hatch partially obscuring the fuselage roundel. (Tom Ivie)

Among the future fighter pilots who trained on P-40s were the pioneering Tuskegee Airmen of the all-black 99th Fighter Squadron. They and the pilots who followed them in the 332nd Fighter Group flew a mixed bag of long-nosed and snub-nosed P-40s during their training at Tuskegee, Alabama.

P-40s did valuable work in the training role straight through to the end of the war. Pilots learned formation flying, air-to-air gunnery, dive-bombing, strafing, and rudimentary blind flying, among other important skills. But perhaps the most important asset pilots gained while flying P-40 trainers was self-confidence.

First Blood in the Pacific

The snub-nosed P-40 made its combat debut in the skies over Luzon in the Philippine Islands on December 8, 1941, the day that the United States entered World War II. Through no fault of the pilots or the P-40Es of the 24th Pursuit Group, the performance was anything but impressive.

Word of the Pearl Harbor attack was radioed to the headquarters of Gen Douglas MacArthur in Manila shortly after Japanese bombs stopped falling on Battleship Row in Hawaii. It was 3:55am December 8 local time in the Philippine Islands, and within hours a Japanese triumph even greater than the destruction of the American fleet at Pearl Harbor would begin to unfold.

On paper, the fighter strength deployed by the Far East Air Force's (FEAF) 5th Interceptor Command on Luzon in early December 1941 looked substantial. Of approximately 100 P-40s in four squadrons, 75 percent were new E-models, while the 20th Pursuit Squadron flew P-40Bs and the 34th Pursuit Squadron had even more outdated Seversky P-35As. These squadrons were units of the 24th Pursuit Group, which was based at Nichols Field just south of Manila along with the 17th and 21st squadrons. The other three squadrons were dispersed at Del Carmen, Clark, and Iba airfields, all northwest of the city. In addition, a radar station was in operation at Iba, on the west coast of Luzon.

The 24th Pursuit Group was far from ready for war. The obsolete P-35As at dusty Del Carmen had been in service for nearly two years and were worn out. The P-40Bs at Clark Field, delivered in the summer of 1941, were in good condition, but their guns had never been fired due to a shortage of ammunition on Luzon. The P-40Es were brand new and subject to several teething problems, including engine fires. In addition, mechanics had complied with an unexplained Wright Field tech order to disable the hydraulic gun-charging system. As a result, the guns could only be charged manually on the ground prior to takeoff, so it was impossible for the pilots to recharge their guns

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1/Lt Boyd D. "Buzz" Wagner, commanding officer of the 17th Pursuit Squadron/24th Pursuit Group, shot down five Japanese aircraft while flying P-40Es over the Philippines during December 1941 to become the first USAAF ace of the war. (Molesworth collection)

in light if a jam occurred. In the 17th Pursuit Squadron, only the guns of commanding officer 1/Lt Boyd D. "Buzz" Wagner's P-40E had ever been fired at all – and his was the most experienced unit in the command. The 21st Pursuit Squadron, with the 34th, had just arrived in the Philippines two weeks earlier; it had only begun to fly P-40Es on December 4. The 3rd Pursuit Squadron, at remote Iba, had further problems because the oxygen systems in its two-week-old P-40Es were inoperable, so the pilots could not fly them above about 15,000ft.

Just as importantly, many of the pilots were fresh out of flying school and unfamiliar with their P-40s. Even the most experienced pilots in the 24th acknowledged that they lacked training and practice in combat tactics, and their radio communications were feeble. Meanwhile, 300 miles north of Manila on the island of Formosa, Japan had amassed a force of nearly 200 Mitsubishi A6M Zero naval fighters, 200 navy bombers and about 150 army aircraft. Many of the men who flew these planes were veterans of combat in China. They were well trained, they knew their aircraft, and they were eager to fight for their country.

Tensions had been building in the Far East for several weeks prior to word of the Pearl Harbor assault. Still, despite ample warning of attack, US Army air units in the Philippines were all but wiped out on December 8. Inexperience, poor communications and the competence of the Japanese attackers all played a part, but old-fashioned bad luck was a factor as well. A ground fog on Formosa delayed the takeoff of the Japanese strike force for several hours that morning. This allowed the P-40s and B-17s at Clark Field just enough time to take off on patrol, exhaust their fuel supplies, and return to base before the Japanese raiders arrived at about 12:20pm. At the same time, a second Japanese formation caught Iba Field equally by surprise. Within minutes, most of the P-40s of the 3rd and 20th squadrons were reduced to junk, along with the bombers on Clark Field. Meanwhile, the 17th Pursuit Squadron and most of the 21st had been circling over Manila Bay on orders from group headquarters.

E

FIRST ACE

1/Lt Boyd "Buzz" Wagner, commander of the 17th Pursuit Squadron/24th Pursuit Group, became the first USAAF ace of World War II on December 16, 1941, while flying a P-40E in the Philippines. On December 10, the Japanese had landed at Vigan, some 200 miles north of Manila on the west coast of Luzon. Eighteen Ki-27 Nate fighters of the JAAF's 24th Sentai flew in from Formosa on the following day and landed on the airfield at Vigan. Wagner was chosen to lead a fighter attack against the airfield. He picked as his wingman 2/Lt Russel Church, one of the most experienced pilots in the squadron. 2/Lt Allison Strauss in a third P-40E would provide top cover. At dawn on December 16, the P-40s approached their target from the sea, taking the Japanese by surprise. Wagner peeled off first, dropping his six 30lb fragmentation bombs on the neatly lined-up enemy planes. Church followed, but his P-40 was hit in the nose section by ground fire as he started his bombing run, and he was immediately engulfed in flames. Church continued his attack, dropping his bombs on the irfield before his P-40 rocked wildly and plunged sideways to earth. Wagner then swung back across the field in a series of strafing runs, joined by Strauss. As Wagner made his last pass, one Nate got off the ground, somewhat obscured by Wagner's wing. He rolled his P-40 inverted to spot the Ki-27, rolled back, chopped his throttle to drop behind the plane and shot it down for his fifth aerial victory. He thus became the first USAAF ace of World War II and earned a DSC. Church won a DSC as well, albeit posthumously.

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A handful of P-40 pilots managed to engage enemy aircraft during the day, and each of them got a nasty shock when they experienced the climbing and turning performance of the previously unknown A6M Zero fighters firsthand. Nine victories were credited to five pilots (plus one in a P-35A), but several P-40s were shot down and nearly all suffered battle damage at the hands of the Zero pilots.

One bright spot emerging from the gloom of the Philippines campaign was the crowning of the first US Army Air Corps fighter ace of World War II, 1/Lt "Buzz" Wagner of the 17th Pursuit Squadron. The 25-year-old Pennsylvanian, who had brought his squadron to the Far East in November 1940, was frustrated at having missed the action on the first day of the war. On December 12, he flew a lone recon mission to Appari in northern Luzon, about 200 miles north of Clark Field, where the Japanese had established an airbase. Two Japanese Army Air Force (JAAF) Nakajima Ki-27 Nate fighters attacked Wagner's P-40E as he approached the field. Wagner climbed up directly into the morning sun, then rolled onto his attackers' tails when they lost him in the glare. The two Nates, flying close together, both burst into flames and went down when Wagner opened fire on them. He made two strafing passes over the field, setting five parked aircraft on fire, then was chased home by three more Nates.

Wagner scored again on December 16 for what was hailed by FEAF as his fifth victory. That morning, a recon mission had revealed the presence of 29 enemy fighters on the airfield at Vigan, site of the Japanese landings on the northwest coast of Luzon. Wagner and 2/Lt Russel Church took off at daybreak from Clark Field in two P-40Es loaded with six 30lb fragmentation bombs under their wings. A third P-40E, flown by 2/Lt Allison Strauss, would provide top cover. Heavy ground fire greeted the diving P-40s, and Church was shot down after releasing his bombs on the target. Strauss then joined up with Wagner, and the two made several strafing passes over the field. On the last pass, a Ki-27 Nate managed to get airborne in front of Wagner's P-40. The 17th Pursuit Squadron commander rolled his plane onto its back to get a better view of the Nate, throttled back to keep it in front of him, then opened fire with the last of the ammunition in his six .50-caliber guns. The Japanese fighter immediately crashed into the ground, and Wagner turned for home.

Wagner was injured in an encounter with Ki-27s on December 22, and his injuries were severe enough to require his evacuation to Australia for treatment. Once recovered, Wagner joined the 8th Fighter Group in New Guinea, flying Bell P-39 Airacobras. On April 30, 1942, he shot down three Zeros, bringing his final score to eight confirmed victories. He was killed in the crash of a P-40 after returning to the US in November 1942.

P-40Es continued to fight in ever-decreasing numbers in the Philippines for four excruciating months. The 37th and last confirmed victory by a P-40 pilot in the Philippines occurred on April 12, 1942, when Lt John Brownewell of the 17th Pursuit Squadron shot down a Japanese floatplane near Del Monte on Mindanao. The campaign ended on May 6, 1942, when starving American forces in the island fortress of Corregidor surrendered.

Meanwhile, P-40Es also had been heavily engaged in the defense of Java, a six-week campaign that again ended badly for the United States and its allies. On January 25, 1942, 13 P-40Es of a new provisional pursuit squadron, also numbered the 17th, arrived in Soerabaja, Java, to provide air defense against the expected Japanese invasion of this oil-rich island. 1/Lt George E. Kiser, one of several veterans of the early fighting over Luzon who flew in the 17th throughout the Java campaign, wrote this account:

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> Soon after we arrived in Soerabaja, we moved to Blimbing, a newly constructed (and well camouflaged) field. All our future activity in the Netherlands East Indies was conducted from this field. The Japanese did not find this base until the day we were leaving for Australia. Here we lived in the little town (Djombang) in some vacated Dutch houses, about three miles from the field. The Dutch assisted us in every way possible, furnishing guards on the field, food and medicine. Living conditions were not too bad …
>
> We flew many missions from Blimbing Field. In fact, a lot of us flew about 150 hours during the short stay there. At all times we were outnumbered at the least 10 to 1, but still we managed to get official credit for in excess of 65 victories [the currently accepted total is 49 – author] with only a loss of nine pilots killed or missing. Our activities ranged from Palembang, Sumatra, where we went to bomb and strafe the airport there, to Koepang, Timor …
>
> On 1 March 1942, the Japanese landed on Java in force, and after attacking this huge armada of ships with only 10 P-40s, it was decided that the situation was hopeless so the entire squadron retreated, along with the 19th Bombardment Group, to Australia.

In Australia, fighter pilots battle-tested in North Africa were returning home at this time to provide leaders with combat experience for Royal Australian Air Force (RAAF) squadrons that would soon fight in the Pacific. The USAAF transferred the first of many batches of P-40s – "Kittyhawks" in Aussie parlance – to the RAAF on March 8, 1942. They were immediately assigned to No. 75 Squadron, which had formed a few days earlier, while two more Kittyhawk squadrons, No. 76 and No. 77, would come together over the next eight days.

The Japanese invaded the strategically pivotal island of New Guinea on March 11, 1942, with landings at Lae and Salamau. On the afternoon of March 17, 75 Squadron RAAF began moving up to Port Moresby, a remote outpost on the southern coast of the island. The squadron's assignment was to oppose Japanese air raids on the town, which had begun in February. The first four Kittyhawks arrived on March 21, and two of them scrambled just two hours later to intercept the daily Japanese reconnaissance flight. Flying officers Barry Cox and Wilbur Wackett caught a Mitsubishi Ki-21 Sally twin-engine bomber over the harbor and shot it down, much to the delight of the troops on the ground.

Under the command of desert veteran Squadron Leader John F. Jackson, 75 Squadron mounted a tenacious defense of Port Moresby through early May, when two P-39 squadrons of the USAAF arrived to relieve the Australians. During that time, the squadron amassed a score of 18 Japanese aircraft shot down, four probables, 29 damaged and about 35 more aircraft destroyed on the ground. The cost was high: 12 pilots, including Jackson, were killed. But Port Moresby remained in Allied hands.

After a rest, 75 Squadron returned to New Guinea to take up station with 76 Squadron at Milne Bay and protect Port Moresby's eastern flank.

Kittyhawk "K" of No. 75 or No. 76 Squadron, RAAF, awaits its next mission at Milne Bay, New Guinea, in late summer 1942. The name FUMANCHU on the nose refers to Dr Fu Manchu, a fictional character introduced in a series of novels by British author Sax Rohmer. (Craig Busby)

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Two squadrons of the 49th Fighter Group, the top-scoring USAAF group of the war, flew P-40s in the Southwest Pacific from early 1942 until mid-1944. "Little Maggie" was P-40N No. 60 of the 8th Fighter Squadron, regular pilot Lt William C. Drier. (Molesworth collection)

There, they were in position to help oppose the Japanese landings at Buna on July 22, 1942, which resulted in an Allied victory that effectively turned the tide of the struggle for New Guinea. That struggle, however, would go on well into 1944.

To the south, Australia suffered its own version of the Pearl Harbor attack on February 19, 1942, when JNAF (Japanese Navy Air Force) land- and carrier-based aircraft struck the northern port city of Darwin in two devastating raids. A convoy of ships, loaded with equipment and troops bound for the defense of Timor Island, was caught in the harbor and mostly destroyed. Dock facilities, a nearby airfield and even a hospital were bombed as well, with a great loss of life incurred.

Ten P-40Es of the just-formed 33rd Pursuit Squadron (Provisional) were in Darwin at the time to escort the convoy while en route to reinforce the 17th Squadron in Java. However, nine of these planes were destroyed in the air and on the ground during the day. Only one American pilot was able to make a claim.

The first Darwin attack, followed on March 3 by a strafing attack on the west coast port of Broome and the fall of Java three days later, stirred a wave of invasion panic throughout Australia. Operational training of the green pilots of the 49th Pursuit Group, many of them recent graduates of flying school, was cut short so they could be deployed to provide air defense. The 49th had arrived by ship on January 28, 1942, and immediately began assembling 100 P-40s while its pilots put the finishing touches to their training. Fortunately, a cadre of 12 pilots just back from Java, including George Kiser, was available to provide experienced flight leaders for the three squadrons of the 49th. The 7th Pursuit Squadron was sent to Horn Island, off the Queensland coast about 75 miles from New Guinea, on March 4. The 8th Pursuit Squadron went to Melbourne on March 5, while the 9th Pursuit Squadron made the long trek from New South Wales to Darwin, arriving at Batchelor Field on March 18.

Japanese air attacks on northern Australia continued sporadically throughout the spring and summer of 1942. The last air raid against Darwin opposed by the 49th (redesignated as a fighter group in May) came on August 23. In this combat, aces George Kiser and Jim Morehead scored their final victories before completing their tours in the Pacific. The total of 15 kills on the day brought the 49th's final tally during the defense of Darwin to 78 confirmed victories, eight probables, and four damaged.

In September, with RAAF fighter squadrons now available to assume air defense duties at Darwin, the 49th Fighter Group began the next chapter in its remarkable history. The fight for Port Moresby was approaching its climax, and the 7th Fighter Squadron was ordered up from Darwin to fight alongside No. 75 and No. 76 Squadrons RAAF in New Guinea.

Under the command of Java veteran Capt Bill Hennon, the 7th Fighter Squadron arrived at 14-mile Drome outside Port Moresby on September 14 and immediately began flying fighter-bomber missions in support of the

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Australian troops fighting along the Kokoda Trail. These missions, which included strafing, dive-bombing, and escort duties, were very effective in helping the Aussies halt the enemy advance. By the end of the month, the Japanese were retreating northward toward Buna. The 8th and 9th Fighter Squadrons, plus 49th Fighter Group headquarters, joined the 7th Fighter Squadron at airfields around Port Moresby a month later. Their first air combat over New Guinea took place on November 1, when the 8th Fighter Squadron claimed two Zeros destroyed for the loss of one P-40. The 9th Fighter Squadron soon traded its P-40Es for new Lockheed P-38 Lightnings, but the other two squadrons continued flying P-40s until June 1944 before following suit. By then, the 49th Fighter Group was well on its way to becoming the top-scoring USAAF fighter group of the war. Another USAAF outfit, the 35th Fighter Squadron of the 8th Fighter Group, had a very successful six months flying P-40Ns starting in the summer of 1943.

Royal New Zealand Air Force squadrons joined USAAF units flying P-40s in the Solomon Islands, 1943–44. Here, the ground crew and pilot of Kittyhawk IV "B" – possibly of No. 18 Squadron – pose for the camera in a shot likely taken at Ondonga in late 1943. (Craig Busby)

RAAF Kittyhawks rejoined the New Guinea fighting in January 1943 and were in position to oppose the last Japanese air raids on Port Moresby and Milne Bay in April. Sporadic aerial combat punctuated steady fighter-bomber work thereafter. The RAAF's last aerial victory of the New Guinea campaign – a Kawasaki Ki-61 Tony shot down by No. 80 Squadron on June 10, 1944 – was also the last kill for a Kittyhawk in Commonwealth service.

P-40s also played significant roles in three other campaigns in the Pacific. The first and longest service was far north in the Aleutian Islands, where P-40s flew in combat from the attack on Dutch Harbor in June 1942 through the capture of Kiska in August 1943. After that, the three squadrons of P-40s continued to provide air defense for bomber bases in the Aleutians through the end of the war.

P-40s of the USAAF and the Royal New Zealand Air Force (RNZAF) took part in the Solomon Islands campaign beginning in November 1942, when the 68th Fighter Squadron arrived on Guadalcanal. On January 15, 1943, while taking part in an escort of B-17s assigned to attack five Japanese destroyers off Faisi, a flight of four P-40Fs from the 68th was attacked by enemy Mitsubishi F1M Pete float biplanes and shot down nine of them. Top scorer was Lt Lloyd G. Huff with three confirmed victories. Further combats with the brave but doomed pilots of the Japanese biplanes came on January 18 and 20, netting five more Warhawk victories.

The USAAF's only all-P-40 unit on Guadalcanal, the 44th Fighter Squadron, arrived at Fighter 2 air base on January 20, 1943. Over the next 11 months the 44th would establish itself as the highest scoring P-40 squadron of 1943, tallying 117.5 confirmed victories before converting to P-38s at the end of the year.

The Allied invasion of Rendova Island and New Georgia, site of the strategic airfield at Munda, on June 30, 1943, set off a new round of air battles over the Solomon chain. From then through August 5, when Munda was captured, the 44th Fighter Squadron scored no fewer than 50.5 victories.

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On the second day of the invasion, July 1, the 44th turned in another stellar performance while defending the invasion fleet between Rendova Harbor and Munda Point. The Japanese sent a formation of Aichi D3A Val bombers with heavy escort to attack the ships, and the Warhawk pilots extracted a heavy toll. One of them, 1/Lt Mel Wheadon, became an "ace in a day" when he was credited with five victories. This is his combat report:

> On patrol to Rendova covering shipping at 5,000 feet. Heard [mission leader Robert – author] Westbrook call 'Tallyho' and at the same instant saw a flight of enemy dive-bombers at 12 o'clock from me peeling off for a run at our shipping. My flight moved right in on them, and we shot down seven dive-bombers. I got four. This action took place low over the water and didn't last long. All of a sudden there just didn't seem to be anything to shoot at, so I started forming my flight.
>
> Westbrook called me and said there was a hell of a fight southwest of where he was and to come on up. We headed for them, but the action wasn't very good. I did get on the tail of a Zero and gave him the works. Fired at another and ran out of ammunition. My fun was over then and there. I had to get the hell out as I was without any guns to help me. Things went well for me until some joker got on my tail. He started firing out of range, which was a good warning for me.
>
> Being at 2,000 feet, there was only one direction to go, and that was toward a beautiful rain squall that I saw three F4Fs and a P-40 go into. So I headed for it. The only evasive action I made was to rotate the stick around the cockpit with both hands and kick rudders as hard as I could first one way and then another. My plane partially stalled and fell off on a wing, which made me turn slightly to cover. When I looked back at my pursuer he was pulling away. He had either thought I was going down or got discouraged as hell from the contortions my plane was going through. My flight accounted for nine planes this day.

No. 15 Squadron RNZAF, equipped with new P-40M Kittyhawk IIIs, moved up to Guadalcanal in late April 1943, to be followed by No. 14 Squadron in June and others after that. They, too, would have great success in the island-hopping campaign up the Solomon chain, claiming 99 victories before converting to Chance Vought F4U Corsairs in mid-1944.

In September 1943 the 45th Fighter Squadron deployed from Hawaii to lonely Baker Island in the Ellice Island group, about 1,650 miles southwest of Honolulu. Its planes were new P-40Ns, camouflaged in a pinkish tan over light blue to blend in with the surroundings. The Seventh Air Force had established a fighter base at Baker in preparation for the upcoming assaults against the Japanese-held Gilbert Islands, about 600 miles to the west. There the 45th sat for the next four months.

No. 120 Squadron of the Netherland East Indies Air Force operated P-40Ns from late 1943 through the end of the war in ground support, and then continued flying them against Indonesian rebels from May 1946 until December 1948. (Aviation Heritage Museum of Western Australia via Craig Busby)

Finally, on January 17, 1944, the squadron moved up to Makin Island, within striking distance of the enemy in the Marshall Islands. The squadron began operations the following day with a mission against the Japanese stronghold at Jaluit Atoll, some 300 miles northeast. The P-40Ns pounded Jaluit and Mili atolls with bombs,

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gunfire and even experimental rockets throughout January. In their single major encounter with enemy fighters, the 45th claimed 10 victories and two probables on January 26. Then the P-40s went back to pounding Jaluit and Mili in preparation for the invasion of the Marshalls. Never again did the tan P-40Ns of the 45th Fighter Squadron encounter Japanese aircraft. With the end of the air campaign in the Marshalls, the 45th returned to Hawaii in March 1944.

In September 1944, the last two fighter squadrons flying Warhawks – the 7th and 8th of the 49th Fighter Group – turned them in and transitioned to the P-38. The weary P-40Ns were refurbished at Mokmer Field, New Guinea, and then the majority of them were turned over to the 71st Tactical Reconnaissance Group in time to take part in the invasion of the Philippines. As best can be determined, the last aerial victory credit to a P-40 pilot in the Pacific occurred on January 29, 1945.

Kittybombers in the Middle East

After eight months of flying Tomahawks against the Axis air forces in North Africa with reasonable success, four fighter squadrons of the Desert Air Force (DAF) began getting new snub-nosed Kittyhawks in December 1941. Production of the Tomahawk had ceased in midsummer. Since then, the Curtiss plants in Buffalo had been pumping out Kittyhawk Mk Is and Mk IAs at a furious pace.

No. 3 Squadron RAAF was first to get the new fighter, beginning December 17. Due to the similarities between the Tomahawk and Kittyhawk, the squadron needed just 11 days to complete its transition. Next to get Kittyhawks was No. 112 Squadron RAF, on December 29. The pilots were happy to be getting new aircraft but perhaps disappointed when they discovered the Kittyhawk's performance barely topped that of their previous mount. Though sturdy, reliable, and well-armed, the Kittyhawk remained underpowered.

The Kittyhawk's combat debut in the western desert was an unqualified success nevertheless. Flying its second sweep of New Year's Day 1942, No. 3 Squadron encountered 16 Junkers Ju 87 Stuka dive-bombers escorted by six Messerschmitt Bf 109s near Agedabia, apparently preparing to attack Allied troops. S/L D. R. Chapman seized the initiative with a rare altitude advantage, leading nine Kittyhawks in a diving attack. The Stukas jettisoned their bombs and turned into a defensive circle as the Kittyhawks rained down on them, shooting down four. The Bf 109 escorts, also caught at a disadvantage, were unable to help the Stukas and in fact lost one of their own to Sgt A. C. Cameron. In the fight, Chapman's Kittyhawk sustained damage from a Stuka's return fire and made a forced landing, but later he managed to fly the plane back to base.

No. 112 Squadron soon flew its new Kittyhawks to the front, followed on February 14 by No. 94 Squadron, which formerly had flown Hurricanes, and No. 450 Squadron RAAF after that. No. 94 had a disastrous first mission on February 15, losing four Kittyhawks and its ace commanding officer, S/L E. M. Mason, and was soon withdrawn for further training.

Arguably the most important change made from the Tomahawk to the Kittyhawk was the provision for the new model to carry additional stores under its wings and belly. A centerline rack was plumbed to carry either a drop tank to extend the plane's range or a bomb for ground-attack operations. A further six small bombs (up to 50lb) could be attached to fittings under the wings. This added offensive capability would give rise to fighter-bomber operations that in time would devastate Axis ground forces in North Africa and inspire a new nickname for the Hawk 87 – "Kittybomber."

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Fighter-bomber tactics took hold in the Desert Air Force when Kittyhawks – with improved load-carrying capabilities – began arriving in Egypt in December 1941. Here, Kittyhawk Is of No. 260 Squadron are prepared for a bombing mission from a desert landing ground. (Aviation Heritage Museum of Western Australia via Craig Busby)

On March 10, 1942, newly appointed No. 112 Squadron commander Clive Caldwell made the first test drop in North Africa of a 250lb bomb from a Kittyhawk. Experimentation continued over the next two months, and on May 16, 1942, the squadron was declared operational as the Desert Air Force's first Kittybomber unit. The timing was fortunate, because on May 26 the Afrika Korps under Gen Erwin Rommel began a new offensive against the Allies' Gazala-Bir Hacheim line, and for the next six weeks the Kittybombers of No. 112 Squadron were heavily involved in attacking the advancing Axis ground forces. June 6 was a particularly grueling day, as the Kittybombers repeatedly attacked enemy armor involved in a fierce tank battle at Knightsbridge.

By the end of the summer in 1942, with the Axis thrust stopped and the front line stabilized at El Alamein, Egypt, the Desert Air Force had eight squadrons of Kittybombers organized into two fighter wings: 233 Wing comprised No. 2, 4, and 5 Squadrons of the South African Air Force (SAAF) (5 Squadron with Tomahawks until early 1943) plus 260 Squadron RAF; 239 Wing comprised No. 3 and 450 Squadrons RAAF, plus No. 112 and 250 Squadrons RAF.

Bert Horden, who would fly in No. 112 Squadron during 1943–44, described in his book *Shark Squadron Pilot* the training in fighter-bomber tactics he received from 239 Wing Training Flight at Darragh Main landing ground prior to joining the squadron:

> I learnt that the formation to be flown was twelve "Kittys" in two boxes of six with the second box flying a few hundred feet above, behind and slightly to one side of the first six, preferably between them and the sun. Dive-bombing was from about 6,000–8,000 feet down to 1,000 feet. The target was approached until it disappeared under the center part of the port wing, count to three and then go into a dive down to the left until the target was in front of the aircraft nose. At about 2,000 feet pull up, count one, two and then release the bomb or bombs. Then we were to reform at about 5,000 feet in the same formation and back to base. The dive was about sixty degrees, but it felt like ninety!
>
> Strafing was, of course, from low level. We followed each other onto the target or targets. Sometimes dive-bombing would be followed immediately be strafing at ground level before reforming. The sky is a big place, and often after bombing and strafing it was difficult to find other aircraft of any sort, the sky looked so empty, never mind a whole squadron to formate with.

Late summer 1942 saw the first three American P-40 squadrons arrive at frontline landing grounds behind El Alamein, or as the RAF called the barren desert area, "The Blue." On July 19, 72 pilots of the USAAF 57th Fighter Group had flown their factory-fresh P-40Fs from the carrier USS *Ranger* off the West African coast to Accra and then proceeded eastward across the continent to their ultimate destination in Palestine. There, the pilots trained for several weeks in Desert Air Force fighter-bomber tactics before moving

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in early August to Egypt, where they flew their first missions while attached to Kittyhawk squadrons of 239 Wing.

By September 13, 1942 the pilots of the 57th Fighter Group had completed 158 sorties with their host RAF and SAAF squadrons. With training and orientation to the desert now complete, the time had come to reunite the 57th so it could begin operating as a unit. On September 16, personnel from the group headquarters and the three fighter squadrons – the 64th, 65th, and 66th – began converging on LG 174, their new home.

No. 112 "Shark" Squadron flew Curtiss fighters in the Mediterranean for three years, beginning with Tomahawks in the summer of 1941. Seen here is FR255, squadron code GA-J, a Kittyhawk III (P-40K). (New England Air Museum)

The 57th Fighter Group began flying missions as part of 211 Group RAF, gaining full operational status on October 7, 1942. Two days later, the Americans recorded their first confirmed aerial victory. Six P-40Fs of the 64th Fighter Squadron, led by its commanding officer, Maj Clermont Wheeler, were escorting 18 Douglas Boston bombers attacking the enemy airfield at El Daba when the action occurred. One of the pilots flying with Maj Wheeler was 1/Lt William J. Mount, who recalled the mission more than 50 years later:

> I was pretty lucky to get the first aerial victory in our unit. I was flying on Bob Barnum's wing, and we were to get the Germans to fly their planes if they could. This usually led them to have lots of maintenance problems. Also, there had been a light rain the night before, which left their field muddy. Barnum saw something and did a quick half roll and split-S that I could not follow. About that time I saw this lone Bf 109 fly across in front of me heading out to sea. I was above him, and he was climbing. I tacked onto his tail diving slightly and caught up with him, gave him a long burst and saw the airplane disintegrate, breaking in two behind the cockpit. It fell into the ocean. By then I was on my own and, as I recall, proceeded to return to base.

At first light on October 24, 1942, some 230,000 men of the Eighth Army began moving forward in three distinct thrusts against the 107,000 Italian and German troops facing them. Above the front, creating an "umbrella" over the Allied troops and a hailstorm of bombs and bullets for the enemy, were massed formations of Desert Air Force bombers and fighters. No. 211 Group RAF boasted seven Kittyhawk squadrons and one Tomahawk squadron, plus three squadrons each of Spitfires, Hurricanes, and 57th FG P-40Fs. A further eight Hurricane squadrons flew in 212 Group, and nine bomber squadrons were equipped with Bostons, Martin Baltimores, and USAAF North American B-25 Mitchells. The primary Axis fighter forces opposing the Allied pilots were the three *gruppen* of the Luftwaffe's legendary JG 27 and one of JG 53, flying Bf 109Fs and Gs, plus seven Italian *gruppi* equipped with Macchi C.202s.

Axis forces gave ground grudgingly in the opening days of the El Alamein offensive, and the Desert Air Force remained heavily engaged. A midday mission by the 64th Fighter Squadron on October 25 brought the initial victory for the pilot who would become the 57th Fighter Group's first ace, 1/Lt Lyman Middleditch Jr. He was flying P-40F No. 17 in a formation of eight P-40s assigned to attack LG-20, a known Bf 109 base. On arrival over

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Merlin-powered P-40Fs first flew in combat in western Egypt with the 57th Fighter Group USAAF. Here, Capt Marshall Sneed of the 65th Fighter Squadron celebrates scoring his first confirmed victory in January 1943 while flying P-40F No. 44, "UNCA BUD IV." The plane was named for the squadron mascot, a rooster named Uncle Bud. (New England Air Museum)

the target, mission leader Capt Glade "Buck" Bilby noted dust rising from the airstrip but no aircraft parked there. Obviously, enemy fighters had just taken off, so Bilby led his formation in a diving attack on a concentration of motor transports parked at the edge of the field. Shortly after the P-40s had released their bombs, five or more Bf 109s attacked them. The 64th Fighter Squadron mission report takes up the story: "Lt Middleditch saw two Bf 109s on Lt (Ernest D.) Hartman's tail, made a right turn and gave the e/a a good burst. The e/a went into the sea." Lt Middleditch's victory was confirmed by three pilots who saw the '109 go down.

A typical mission of this period produced an atypical result for No. 112 Squadron RAF on November 1. After bombing a troop encampment at dawn on an armed reconnaissance, the squadron spotted about 30 Stukas with Bf 109 escorts and attacked. As the Kittyhawks closed on them, the Stukas jettisoned their bombs onto a formation of Axis troops. Before the Bf 109s could intervene, the Kittyhawk pilots claimed seven Stukas destroyed and several more probables or damaged. One Kittyhawk was shot up and crash-landed, the pilot returning to the squadron on the following day.

By November 4, it had become clear to Rommel that the Afrika Korps faced destruction if it did not disengage from Montgomery's attacking Eighth Army at El Alamein. Much to the displeasure of his superiors in Berlin, Rommel ordered his forces to begin an orderly retreat westward. Thus began the next phase of war in The Blue: a 1,400-mile chase across Libya and Tunisia that would continue until the following spring. Rommel, for all his brilliance as a tactician and field commander, had simply not been able to overcome the sheer weight of numbers commanded by Montgomery. Further, the USAAF added two more P-40 fighter-bomber groups, the 79th and 324th, to the Desert Air Force, and both would serve with distinction in the desert campaign.

Of all the missions flown by P-40s in the Mediterranean Theater of Operations (MTO), none stands out so clearly as the 57th Fighter Group's late afternoon show of April 18, 1943, known by the participating pilots as the "Goose Shoot" but soon upgraded by the press corps to the moniker "Palm Sunday Massacre." On that single mission, Warhawk pilots of the 64th, 65th, 66th and 314th FS/324th FG were credited with destroying no fewer than 74 German aircraft – mostly Junkers Ju 52 tri-motor transports – during a 20-minute engagement over the Gulf of Tunis, losing just six of their own. In addition, four pilots joined the P-40 list of aces that day.

Meanwhile, Rommel was facing a new threat from the west. In the predawn hours of November 8, 1942, a vast armada of 500 warships and 350 transports converged at several locations off the coastline of northwest Africa and began disembarking American troops bound for Casablanca, Morocco, plus Oran and Algiers, Algeria. This was Operation *Torch*, the opening of a second front on the African continent.

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Among the eight American fighter groups of the USAAF Twelfth Air Force supporting Operation *Torch* was the 33rd, which flew 77 P-40Fs off the carrier USS *Chenango* to the French airbase at Port Lyautey, Morocco, on November 10. Then the 33rd Fighter Group experienced the classic military phenomenon, "hurry up and wait." The quick French capitulation left the Warhawk pilots with little to do for the rest of November but fly patrols and stand alert for air attacks that didn't come.

Five American fighter groups flew P-40s in the Mediterranean Theater, 1942–44. This P-40F-20, with the name "Miss Jeanne" chalked on the nose, was photographed at El Kabrit in February 1943. (Molesworth collection)

Orders moving the 33rd Fighter Group to the front arrived in early December. The 58th Fighter Squadron flew to Thelepte on December 6, 1942, thus becoming the first American squadron to operate from an airfield in Tunisia. The 60th Fighter Squadron went first to Youks-les-Bains, Algeria, and on to Thelepte a few days later. The 59th Fighter Squadron remained at Casablanca for the time being, checking out French pilots of the newly reformed "Lafayette Escadrille" in P-40s. The 59th's pilots were disappointed to learn on December 20 that their P-40Fs had been transferred to the French unit, and they would be moving up to Thelepte with just five aircraft.

Commanding P-40 operations at Thelepte was Maj Phil Cochran. He wasted no time before unleashing his unit against Axis forces in the Kasserine-Gober-Sousse Triangle. In addition to flying defensive patrols, Cochran's P-40s disrupted the enemy with a series of armed reconnaissance, bombing, and strafing missions against troop concentrations, port installations, fuel dumps, bridges, highways, and rail traffic. The 33rd Fighter Group's first aerial victory occurred on December 12, when 1/Lt Charles B. Poillon of the 58th Fighter Squadron shot down a German Junkers Ju 88 near Youks-les-Bains. The bomber was first credited to Poillon as damaged, but later was upgraded to a confirmed victory.

In early January 1943, the Luftwaffe stepped up pressure on the Allies' forward airbases in Tunisia and Algeria. Enemy attacks peaked on January 15 when Thelepte was raided three times and Youks-les-Bains once. The 33rd Fighter Group was credited with eight of the 15 victories claimed by the Twelfth Air Force that day and was awarded a Presidential Unit Citation for its efforts. Top scorer was Capt Carmon B. Boone of the 59th Fighter Squadron.

With four enemy aircraft destroyed on the day, Capt Boone immediately was the 33rd's top scorer and appeared likely to become the unit's first ace as well. This was not to be, however, as Boone was shot down and killed just over two weeks later. On February 8, down to just 13 flyable aircraft and with its roster of pilots diminished as well, the 33rd Fighter Group pulled out of Thelepte. Three days later the surviving pilots arrived at Agadir, Morocco, for a well-earned rest and re-equipment with new P-40Ls. Some of their replacement planes were transfers from the 325th Fighter Group, which had arrived in North Africa via aircraft carrier in mid-January but would not commence combat operations until April.

The 33rd Fighter Group returned to Tunisia in mid-March and resumed its intense schedule of operations, having numerous encounters with enemy aircraft. The mission of March 15, 1943, was a 36-plane escort of B-25s attacking the airfield at Mezzouna, Tunisia. Enemy fighters rose to defend the

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base, and in the fight that developed three of them went down and four were damaged. Major Levi Chase, CO of the 60th Fighter Squadron, was credited with one victory over a C.202. It was his fifth confirmed kill, making him the 33rd Fighter Group's first ace and therefore the first P-40 ace in the Twelfth Air Force. Chase scored five more kills by April 5. His score of 10 destroyed and one damaged made him the top American ace in the MTO at that time, and the top USAAF MTO P-40 ace of the war. His score paled in comparison to that of Australian Clive Caldwell, however, who scored 20 confirmed victories and three shared while flying Tomahawks and Kittyhawks in the desert.

Also on April 5, the 325th Fighter Group got orders to move two of its squadrons to the frontline airfield at Montesquieu, Algeria, about 100 miles east of Tunis. The group flew its first official combat mission on two days later, when 36 P-40s provided escort for B-25s assigned to attack Mateur. One P-40 was shot down, but later the 325th would look back and realize that it was the first of 59 consecutive escort missions flown by the group in which no bombers were lost to enemy fighters.

By April 14 the front lines had moved deeper into Tunisia, and the 33rd Fighter Group moved to a new base at Ebba Ksour. From there, the group kept up a steady pace of bombing and strafing missions into the shrinking Axis-held territory, hitting the cities of Bizerte and Tunis along with airfields, highway traffic and other targets of opportunity. The group had few opportunities for further air combat before the German and Italian forces in North Africa surrendered on May 13, 1943.

Over Southern Europe

With North Africa now safely out of Axis hands, Allied leaders immediately began looking across the Mediterranean Sea toward Italy in mid-May 1943. Their first stop on the route through the tragically misnamed "soft underbelly" of Europe would be Sicily, but first they needed to neutralize the Italian-held island of Pantelleria.

An interesting sidelight to the Pantelleria campaign was the combat debut of the 99th Fighter Squadron, equipped with P-40Ls. This unit, consisting entirely of black personnel, initially was assigned to the 33rd Fighter Group for operations and flew its first mission on June 2, strafing Italian positions on Pantelleria.

F

112 SQUADRON'S LAST KITTYHAWK VICTORIES

The last aerial victories scored in a Kittyhawk in the Mediterranean Theater occurred on April 7, 1944, when 112 Squadron RAF encountered Focke-Wulf 190s of I/SG 4 over Rieti aerodrome in Central Italy. Led by F/Lt Lance "Happy" Ahern, 12 Kittyhawk IIIs caught the Luftwaffe unit taking off on a dive-bombing mission and shot down two Fw 190s while losing two Kittyhawks in the process. As he approached the target, the leader told the top six Kittyhawks to stay up. F/Lt Ahern (in FT854 GA-B) attacked an aircraft taking off, seeing strikes and noticing that his No. 2, F/Sgt K. C. Warburton (FR857 GA-V), was with him. F/Sgt B. H. Peters (FR862 GA-E) then attacked this aircraft, which still had its wheels down. The '190 blew up and crashed in flames just northeast of the aerodrome. F/Sgt W. E. Cocks attacked another Focke-Wulf taking off, and it was seen to crash in flames at the edge of the aerodrome. F/Sgt Cocks made a stall turn to attack another '190 but went into a spin and crashed 1 mile southeast of the aerodrome, his aircraft and bombs exploding. The top six aircraft joined the fight and damaged three '190s. F/Sgt Cocks was killed in the action, and F/Sgt Warburton was shot down and captured. German losses were Hptm Heinrich Zwipf, I/SG 4 gruppenkommandeur and a highly decorated former Stuka pilot, and Uffz Kurt Fischer of 1./SG 4. F/Lt Ahern's Kittyhawk was badly shot up but brought him safely home to his base at Cutella.

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While most of the Northwest African Air Forces' attention was focused on Pantelleria following the victory in Africa, other targets beckoned as well. For the 325th Fighter Group, which in June began painting the tail surfaces of its P-40s with distinctive black and yellow checkers, the summer of 1943 would be dominated by a series of missions across the Mediterranean to Sardinia. The purpose of these missions was to keep the defending Axis fighters occupied so they would not be available to assist in the defense of Sicily.

It was during the 325th Fighter Group's campaign over Sardinia that the "Checkertails" established a reputation for prowess in air-to-air combat that survives to this day. Between mid-May and late September, Warhawk pilots of the 325th racked up no fewer than 102 victories in 37 missions for the loss of just 16 of their planes. In the process, all four of the pilots who would become aces in P-40s scored their fifth victories over Sardinia, and several future aces opened their scoring tallies on these missions.

While the aerial campaigns against Pantelleria and Sardinia were spectacular and successful, the Allies' invasion of Sicily was the high point of the war in the MTO during the summer of 1943. The NAAF threw its full force into the process of softening up Sicily, starting as soon as Pantelleria fell. Massive formations of medium and heavy bombers, covered by swarms of fighters, ranged over Sicily beginning in late June attacking airfields, lines of transportation and communications, supply depots and anything else they could find of military value. Axis fighter units on the island responded as best they could, but they were greatly outnumbered and doomed to failure.

Of the NAAF P-40 and 239 Wing Kittyhawk units involved in the pre-invasion operations over Sicily, the 324th Fighter Group, operating as an independent unit for the first time and with the 99th Fighter Squadron attached, saw the most action. While the 324th Fighter Group was flying its missions from Cape Bon to Sicily, the 33rd was performing similar duties from its newly captured base on Pantelleria. The 57th and 79th groups were not employed until after the landings. Once the Allied ground forces began to advance on Sicily, the Luftwaffe fighter units were forced to withdraw to landing grounds near Foggia, Italy. The rest of the campaign was primarily fighter-bomber work.

The Allies had already begun their softening-up air campaign against mainland Italy when the remaining Axis forces on Sicily surrendered on August 17, 1943. By this time, three P-40 groups – the 33rd, 57th, and 79th – were operating from Sicilian airfields. Commonwealth Kittyhawk squadrons were attacking Italy as well, No. 3 Squadron RAAF averaging 12 sorties per day between July 13 and September 14.

The British Eighth Army opened the invasion of Italy on September 3 with landings on the "toe" of the nation's "boot" at Reggio di Calabria. Just five days later the Italian government capitulated, having deposed the dictator Mussolini in late July. Now with German forces as their only foe, the Allies staged two more landings, at Taranto and Salerno, on September 9. P-40 and Kittyhawk squadrons began moving to captured bases in southern Italy on September 15. With a stalemate developing on the ground and the Luftwaffe now operating from bases north of Rome, these squadrons once more found themselves operating as long-range artillery in the fighter-bomber role, with little opportunity for air-to-air combat.

One of the more spectacular missions of this period was flown on May 5, 1944, when Kittyhawks of No. 3 RAAF and No. 5 SAAF squadrons participated in a dive-bombing attack using 2,000lb bomb loads successfully to breach sluice gates of the Pescara River hydro-electric dam.

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At the end of 1943, new Republic P-47 Thunderbolts began replacing the aging P-40s in the USAAF Twelfth Air Force squadrons. By the following summer, no P-40s remained, and only a few Commonwealth squadrons continued flying Kittyhawks. P-51 Mustangs began replacing Kittyhawks in Italy in April 1944. No. 112 Squadron RAF scored the last Kittyhawk aerial victories in the MTO when it caught about a dozen FW 190s taking off from Rieti on April 7, 1944, and downed three, against two losses of their own. The last unit flying Kittyhawks was No. 450 Squadron RAAF, which was in the process of transitioning to Mustangs when the war ended.

China-Burma-India

On the afternoon of February 16, 1942, a Douglas DC-3 transport lifted off the runway at Kunming, China, and headed for Calcutta, India. Aboard the plane were six pilots of the 1st American Volunteer Group, Chinese Air Force. The AVG had been in combat against the Japanese for nearly two months, registering some notable successes in the fight to protect Rangoon, Burma, and the Burma Road from enemy attacks. By now, the AVG's complement of Curtiss Tomahawk fighters was running low, and the six pilots on the DC-3 were on their way to Cairo, Egypt to pick up new P-40Es and ferry them back to China.

After a series of delays, the AVG pilots reached Cairo a week later, only to find their new fighters were still at Accra, on the Gold Coast of Africa, where they had been assembled after delivery by ship from the US. So the pilots hopped a flight on a westbound Army Douglas C-53 and headed across the continent on the final three-day leg of their 7,500-mile trip, arriving on February 27. As AVG pilot R. T. Smith recorded in his diary (published in his book *Tale of a Tiger*), they flight-tested the P-40Es on the following morning:

> Got up at 7:30 and went to the field. We all got lined up on our ships eventually, and each flew about one hour. I was lucky and got the first one, and was first in the air. Greene's and my ship had no belly tanks installed, and we put on a little show for the Pan Am boys. The ships are quite a little nicer than the Tomahawks. These are called Kittyhawks, and have better cockpit arrangement, six .50-caliber machine guns, more power etc.

It took the AVG pilots three weeks to ferry the P-40Es back to China, due to mechanical failures, bad weather delays, and other trouble. The leading four touched down at Kunming on March 22, 1942, delivering the first P-40Es that would see action in the China-Burma-India theater. AVG ground crews set to work on the P-40Es, replacing their USAAF markings with Chinese Air Force sun roundels, painting the AVG's distinctive shark's mouth design on their noses, harmonizing their guns to converge fire at 300 yards in front of the plane, and repairing various minor problems. Eventually, the AVG would receive 30 P-40Es.

Major Bruce K. Holloway, one of the top-scoring P-40 aces of the USAAF, flies his P-40E No. 104 of the 76th Fighter Squadron/23rd Fighter Group over Lake Kunming, China, during late 1942. (Molesworth collection)

The first combat for AVG P-40Es came on April 8, 1942, when three of them at Loiwing, China, scrambled alongside Tomahawks to intercept a Japanese

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New P-40Ns of the 29th Fighter Squadron/5th Fighter Group/Chinese-American Composite Wing are parked at Kweilin, China, in the spring of 1944. Chinese and American pilots shared the P-40s in CACW squadrons. (Fred Chiao)

air raid on the field. Flight Leader Robert L. Little of the 1st PS, flying one of the P-40Es, was credited with shooting down a Nakajima Ki-43 Oscar among the 12 victories claimed that day, the first claim in a snub-nosed P-40 by the AVG.

The AVG P-40Es were heavily engaged during the final three months of the unit's existence. Their most notable actions were a series of raids against Japanese army forces in the Salween Gorge on the China-Burma border in May 1942, when AVG pilots used the P-40E's dive-bombing capability to devastating effect to halt the enemy advance. Sadly, Bob Little was killed flying one of those missions.

When the AVG disbanded on July 4, 1942, its P-40Es and Tomahawks were turned over to the 23rd Fighter Group of the USAAF, which was activated in Kunming that day to carry on the fight in China under legendary commander Claire Lee Chennault. Meanwhile, a second USAAF P-40 fighter group, the 51st, had arrived in India and was taking up positions in Assam. These two groups, flying from their bases at either end of the air route from India into China, would have responsibility for protecting transport planes flying over "The Hump" from interception by Japanese fighters.

In eastern China, Chennault also maintained a line of airbases that put his P-40s in range of Japanese strongholds at Hankow on the Yangtze River and Hong Kong on the coast. His fighters also could reach enemy bases in French Indochina from Kunming. And reach they did, flying thousands of offensive and defensive sorties to run up an admirable record of destruction over the next two years. The 51st Fighter Group didn't have as many opportunities for aerial combat as did the 23rd, but made the most of its limited chances while also pressuring Japanese units on the ground in Burma.

When another USAAF fighter group, the 80th, arrived in Assam in the fall of 1943 equipped with P-40N-1s, the 51st Fighter Group moved its P-40s to China to join Chennault's Fourteenth Air Force there. The buildup continued at the end of 1943, when the first two Chinese-American Composite Wing (CACW) P-40 squadrons arrived in China; eventually the CACW's 3rd and 5th fighter groups would number eight squadrons of P-40Ns. They were heavily involved in opposing the huge Japanese ICHIGO offensive in 1944. Two other USAAF fighter groups, the 33rd and 81st, flew P-40s briefly when they arrived in 1944 before transitioning to P-47s, and the 4th and 11th fighter groups of the Chinese Air Force also flew snub-nose P-40s in defense of the capital at Chungking.

Despite having such success with his P-40s, Chennault began pressuring Washington to send high-performance P-51s to China as early as 1942. The first of these, Allison-powered P-51As for the 76th Fighter Squadron, arrived in late 1943. From then on, Mustangs steadily displaced P-40s in China. The 27th Fighter Squadron/5th Fighter Group of the CACW was the last P-40 outfit, converting to P-51s in June 1945. Still, the shark-mouthed P-40 is the iconic aircraft of the CBI. No fewer than 53 aces of the CBI scored at least one aerial victory in a P-40, and the pilots of snub-nosed P-40s claimed nearly 800 enemy planes shot down in the theater.

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On the Russian Front

The massive scope of warfare on the Eastern Front has helped to obscure the fact that snub-nosed P-40s in Soviet air regiments were heavily engaged there against the Germans from 1942 through the end of the war. After initial deliveries of 247 Tomahawks starting in September 1942, the three branches of Soviet aviation received no fewer than 2,178 P-40E, K, L, M, and N aircraft via the American Lend Lease program.

Initially, P-40s were shipped by naval convoys to the northern port of Arkhangelsk. The fighters were erected there and flown in combat by the 126th, 154th, and 159th air regiments on the Kalinen and West fronts, then in the defenses of Moscow and Leningrad. When the far northern port of Murmansk was free of ice, the Allied convoys dropped off P-40s there, with deliveries of snub-nosed P-40s continuing from January 1942 through April 1944.

A second major delivery route brought in Lend Lease P-40s and other types on the southern route through Iran. The last P-40N-30s flew in from Tehran in November 1944. A small number of P-40s also arrived via the long aerial delivery route from Alaska through Siberia in late 1942, but technical problems associated with the extreme cold in Siberia canceled these flights after a few months.

Soviet pilots were not impressed with the P-40, having been trained to value speed and maneuverability over the P-40's main attributes of durability, range, and firepower. They did, however, find the P-40 effective in ground attack, long-range escort, and reconnaissance duties. Most of them preferred another American fighter, the Bell P-39, an opinion that challenges the generally accepted thought that the Airacobra was the least effective USAAF fighter of the war.

One pilot who valued the P-40's ability to absorb battle damage was Lt Aleksey Khlobystov, commander of the 20th Guards IAP. Flying a Tomahawk, this daring pilot once downed two Bf 109s by ramming during the same sortie. He followed that up with a third ramming maneuver on May 14, 1942. Khlobystov, flying his No. 812 Kittyhawk, approached a Bf 109 that was attempting to engage him head-on. He was thrown free of his cockpit when the two fighters collided and managed to reach the ground badly injured but alive. After a long convalescence, Khlobystov returned to operations but was killed in action in December 1943.

During the course of the war, P-40s in Soviet service ranged from recon missions over northern Norway and convoy cover in the Arctic as far south as Romania, where P-40s harassed German ground forces retreating from the Crimea in 1944. Three of the 27 pilots who earned Twice Hero of the Soviet Union status flew P-40s, and several regiments gained Guards status while flying the P-40. As in every theater of the war, the snub-nosed P-40 was there on the Russian front when it was needed, providing valuable service in the Soviet Air Force.

Lend Lease P-40s bound for the Soviet Union await delivery in Iran, December 1942. In the foreground is 42-10135, a P-40K-10 displaying a Soviet Air Force star under its wing and its USAAF serial number on the tail. (Craig Busby)

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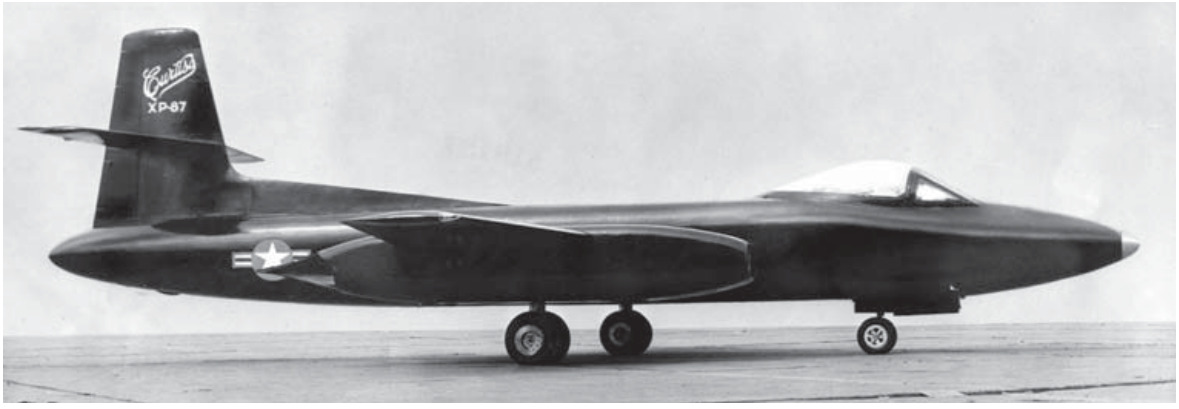

The last attempt by Curtiss to build a fighter for the USAAF was the XP-87 Blackhawk, a large all-weather fighter powered by four jet engines. Though initially ordered into production in 1948, it was subsequently canceled in favor of the superior Northrop F-89 Scorpion and Lockheed F-94 Starfire. (Air Force Museum)

CONCLUSION

Any discussion of the P-40 inevitably leads to this question: considering the fighter's shortcomings, how did Curtiss manage to build so many? It's a fair question; one that even drew the attention of the US Senate's Special Committee to Investigate the National Defense Program – the so-called Truman Committee.

The simple answer is that Curtiss didn't set out to build all those thousands of P-40s, and in fact its design team worked hard – though unsuccessfully – throughout the war trying to come up with a successor for it. This effort actually began in 1939, while the Hawk 81 was still under development. But these were boom times for Curtiss-Wright, and the company was chasing profitable contracts for all manner of military aircraft, from the big C-46 Commando transport and SB2C Helldiver dive-bomber to the SO2C Seagull scout plane and the AT-9 twin-engine trainer, among others.

Whether the problem was insufficient size and talent, management interference or a combination of these factors, Curtiss's design staff simply failed to create a new fighter that would have been good enough to justify disrupting P-40 production long enough to change over the tooling to a new type. Further, the company opened a second manufacturing plant in Buffalo, another in St Louis, MO, and two in Canada. The management challenges inherent in such a far-flung enterprise led to inevitable lags in quality control.

Despite the failure to develop a P-40 replacement, Curtiss still considered itself a builder of fighter planes when the war ended in August 1945. When the USAAF issued a specification shortly after V-J Day for an "all-weather fighter" equipped with radar for operations in darkness or fog, the Curtiss design team went to work on its first jet, the XP-87 Blackhawk. The market for military aircraft promised to be slim in the postwar era, so the XP-87 was a make-or-break proposition for Curtiss.

The Blackhawk first flew on May 5, 1948, and was redesignated the XF-87 the following month. Because of the limited power output of the early jet engines, the plane was fitted with a pair of Westinghouse J-34s in a nacelle under each wing. Apparently, the XF-87 met the requirements of 600mph top speed and a service ceiling of 41,000ft, and the US Air Force issued orders for 58 F-87As and 30 RF-87As at a cost of $82 million. By this time, however, Northrop and Lockheed had developed more promising night fighters, the XF-89 and XF-94 respectively. On October 18, 1948, the F-87 orders were canceled to free funding for the newer night fighters. Demoralized by the loss of yet another lucrative contract, Curtiss management got out of the warplane business, never to return.

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